117385
JUN 21 1882
SMITHSONIAN DEPOSIT

THE AMERICAN GAS LIGHT JOURNAL

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, VENTILATION, WATER SUPPLY AND DISTRIBUTION, & GENERAL SCIENCE.

VOLUME XXXVI No. 6. Whole No. 546. | NEW YORK, THURSDAY, MARCH 16, 1882. | $3 PER ANNUM IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager
G. WARREN DRESSER, C.E., Editor.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND CLASS MATTER.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European Countries, $3 50 (15 shillings—18 francs). All payments to be made in advance. Single copies, 15 cents.

Remittances should be made either by post-office order, registered letter, or bank draft on New York, payable to the order of A. M. Callender & Co.

Collections are invariably made directly from this office, for subscriptions, advertisements, etc. We have agents to solicit the same, but they are not authorized to receipt for money.

Correspondence.—Wishing to make this Journal a gazette of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, correspondence is solicited for publication from all who make the study of these subjects a pleasure or a profession.

CONTENTS.

☞ An asterisk (*) denotes an illustrated article

EDITORIALS—

The Western Gas Association 121
Volume III. King's Treatise on Coal Gas 121
Proposed Electric Lighting in Boston 121
Explosion at the Wilkes-Barre Gas Works 122
Twelfth Annual Meeting of the New England Association of Gas Engineers 123
Non-Conductivity of Different Materials 130
The Gaslight and Coke Company 130
Steamy and Frosted Windows 131
Purification of Naphthaline 132
Action of Hydraulic Cements upon Embedded Metals 132
Street Lighting in Cincinnati 132
Deaths Caused by Gas 132
Serious Gas Explosion 132
Price of Coal at Pittsburgh 132

CORRESPONDENCE—

Corrections 132
Not Recommended 132

[OFFICIAL NOTICE.]

The Western Gas Association

SECY'S OFFICE, WESTERN GAS ASSOCIATION,
110 VINE ST., ST. LOUIS, MO., Feb. 21, 1882.

The Fifth Annual Meeting of the Western Gas Association will be held at the Grand Pacific Hotel, Chicago, Ills., on the 10th, 11th and 12th days of May, 1882. A full attendance is requested, as matters of great interest will be presented at the Meeting.

LEE A. HALL, *Secretary.* THOS. BUTTERWORTH, *President.*

VOLUME III. KING'S TREATISE ON COAL GAS.

In our last issue we called attention to the fact that this valuable work is now complete. Orders for the same, accompanied by draft or post office money order for $8.20 from subscribers to former numbers, or $8.80 from new subscribers will be received at this office, and should be sent at once.

PROPOSED ELECTRIC LIGHTING IN BOSTON.

The Boston *Traveler*, of March 8th, 1882, gives a report in full of a hearing before the Boston Board of Aldermen, on Monday, Nov. 6th, upon the following petition :

To his Honor the Mayor and Board of Aldermen :

The petitioners respectfully represent that they have established themselves as electric lighting companies in the City of Boston ; that they have invested a large amount of capital in the business ; that the light is now in practical operation in all the leading cities of the country and in Europe ; that it is beyond doubt the proper light for squares, streets and crowded thoroughfares ; that it is a cheaper, better, and far more brilliant light than gas for city lighting ; that if reasonable encouragement is given, we can be prepared to light the streets of Boston, including Boston proper, South Boston, East Boston, Charlestown and Roxbury, when the present contracts expire, at a price as cheap as gas, but at the same time with a better light ; that we can furnish at least 100 per cent. more light for the same amount of money than is now furnished by the gas companies. In view of these facts we respectfully ask the Board of Aldermen to take this subject into consideration, and give us a public hearing at an early day.

We feel that we can show that it would be a great advantage to the city to use electric lights ; that their general adoption would be conducive to good morals, make our streets more safe at all hours of the night, assist the police in the performance of their duty, prevent a large increase in the expenses of the police department, prevent disorder in certain sections where rowdyism is of nightly occurrence, and make the homes of the poor, in crowded sections of the city, more pleasant and attractive.

We would respectfully call the attention of your honorable board to our Common and Public Garden, now such dismal looking places in the night time, and useless to the public. The use of electric lights would make these resorts as safe and pleasant at night as they are now in the day-time. This would add greatly to the pleasure and comfort of our citizens.

We would call your attention to the fact that our public squares should be more brilliantly lighted. This can only be done by electric lights. That our principal business streets should be better lighted. This can only be done by electric lights. That all the leading avenues to the city proper from Charlestown South and East Boston, and Roxbury should be better lighted. This can only be done by electric lights.

To do this work requires large expenditures for machinery and building. This expenditure we are ready to make if the Board of Aldermen gives us reasonable encouragement. We call your attention to this matter at this early day, so that if such encouragement is given, we may prepare, in the meantime, to do the work, when the present gas contracts expire.

The Brush Electric Lighting Co.
By Hugh O'Brien, Treasurer and Manager.
American Electric Lighting Co., of Massachusetts.
By Edward H. Goff, Vice-President.
The New England Weston Electric Light Co.
By Moses Williams, Jr., Treas.
The Jablochkoff Electric Co. of New England.
By Moses Williams, Jr., Treas.

The first speaker on behalf of the petitioners was Mr. O'Brien, of the Brush company, who was last year an Alderman, and member of the committee on lamps and gas. His address was quite extended, and was inter-

esting from various circumstances. After giving a concise reference to the progress of electric lighting, he stated that in this country there were, in February, 1882, 13,050, and in Great Britain 2,711 electric lights in operation under the Brush system, making in all 15,761 Brush arc lights. There are, according to Mr. O'Brien, 40 companies in the United States operating with these lights, representing a capital of $7,000,000. How much of this capital has been actually paid in in cash was not stated; but the items of the location of the companies are given as follows: New York, 6; Massachusetts, 1; Rhode Island, 1; Pennsylvania, 3; Maryland, 1; Ohio, 5; Indiana, 1; Illinois, 3; Michigan, 3; Louisiana, 1; Colorado, 1; Utah, 2; California, 1; Texas, 1; Virginia, 1; Kentucky, 1; Kansas, 1; Dakota, 1; Wisconsin, I; Tennessee, 1; Georgia, 1. From this it would seem that in the present stage of the business an average capital of $536 was employed for each Brush light now in use in this country; so that, to pay ten per cent., each light must earn $53.60 per annum clear of all cost and charges.

The usual "French measurement" is employed in speaking of the candle power of the electric light. Nothing less than 2000 candles per lamp is contemplated for a moment which, upon the supposition that 1500 of them were erected on lamp posts, to be provided by the City of Boston, would shed an effulgence of light most difficult to comprehend when expressed in terms of a poor diminutive candle, for Mr. O'Brien says that such a light would equal three millions candles, and this enormous flood of light is set against the light of 10,296 gas lamps (figured, of course, by the discount rule, and not the French method) which is only 123,552 candles. Really, it is difficult beforehand to form a conception of the brilliancy of the halo that would surround the "Hub of the Universe," when this contemplated improvement shall be consummated. When some questions were asked as to the reason why the replacing of 13 gas lamps by five electric lights in Scollay Square cost $810.68 more than the gas did, the reply was rather general in its nature, and did not show exactly why it was.

It was proposed to light the Common and Public Gardens (73¼ acres) with 60 arc lights, at a cost of $14,235; or, if the arc system is used, it is supposed that two masts would light the Common and Public Garden at an estimated expense of $9000. This system of masts would work much better in the winter than in the summer, when the trees are in full foliage, for the deeds of darkness, to which Mr. O'Brien referred as preventing respectable ladies and muscular men from visiting the Common at night, would be particularly facilitated by the deepness of the shadows cast by the powerful electric lights placed above the magnificent trees which constitute one great beauty of the Common.

Mr. Moses Williams, Jr, appeared for New England Weston Co., and was prepared to supply such number as the city may require of arc lights for 58 cents each per night; or he would supply 10,000, or less, incandescent lights, to be placed in present lamp posts, for 13 cents each per night, the latter to be of 24 candle power; or, if preferred, he would furnish lights of 40 candle power for 16 cents each per night.

The present cost of street gas lamps according to published reports for the entire city is about 9 cents per lamp per night, but for the city proper it is not quite 8 cents. Prof. Bernstein appeared on behalf of the petitioners to explain how small the danger was from electric lighting when the systems were properly arranged, and considerable discussion took place on this point; and it would appear that some of the questions asked were rather difficult for the Professor to understand.

In reply to the petitioners, the Chairman read the following:

To the Honorable Board of Aldermen:

The Boston Gaslight Company respectfully represent that they do not propose to object to any method of lighting the streets of Boston that shall be deemed necessary for the public safety and convenience. If the City Government should see fit to appropriate a sum of money for additional illumination, this corporation is desirous of making a proposal for the purpose, in the belief that when the safety, certainty and diffusive power of their light is taken into account, a proposition may be made more satisfactory to the city than any now before it.

The Boston Gaslight Company,
By W. W. Greenough,
Treasurer.

March 6th, 1882.

Mr. Monks, of South Boston, spoke, as a gas man, to the effect that all well-informed gas managers recognized the electric light as an important element in public lighting, and that it was entitled to consideration according as it demonstrated its power to do its work cheaply and efficiently; and that all systems of lighting must stand or fall on their merits, as they are economical, safe and reliable. That existing companies had complied with certain obligations, and had certain claims for consideration whenever new contracts were made. As a private citizen, and a taxpayer, he objected to the development of any system of lighting at public expense, and protested against going into electric lighting on a large scale, and at large expense, until the claims made were more fully demonstrated as practical.

The present contracts do not expire until 1883.

Explosion at the Wilkes-Barre Gas Works.

[From the Wilkes-Barre Daily *Record.*]

Houses in the vicinity of the Square were shaken violently at 4:30 yesterday afternoon, and a loud report was heard. People were considerably startled, and many believed that the powder works at Laurel Run had exploded, while others thought that a terrific commotion had taken place at some of the mines. In a short time, however, the intelligence spread throughout the city that the gas house of the Wilkes-Barre Gas Company, located between the canal and the river, facing North street, had been demolished by an explosion.

A reporter immediately started for the scene and joined a vast number of people hurrying in the same direction. It was found that the northern half, containing the purifying department, had been reduced to a pile of debris. The explosion drove the framework toward the river and it was almost impossible to pass along on that side. The huge timbers were twisted in all shapes and thousands of bricks lay scattered upon the ground. The sides of the building were entirely shattered, but part of the northern wall remained intact. The generators, although located in the part that was demolished, were not injured. The boilers and the engine were all right. The slate upon the roof of the remaining part of the building is nearly all torn off. The walls are damaged and will have to be taken down. Some of the timbers flew high in the air and fell on all sides. The canal was nearly filled with slate and woodwork. Doors and windows in houses near by were broken and many of the people were terribly frightened. A passing buggy, containing Christian Bach and Mr. Miller, the grocer, had a wheel taken off. Henry C. Reichard was walking along the street at the time and was thrown to the ground and stunned. He felt some pain for a short time afterward.

There were five men in the building when the explosion occurred. They had banked the fires and were preparing to go home. All were prostrated. Tim Lenahan was slightly injured by the fall and Pat Connolly had his face cut by a brick. Had any of the employees been in the part torn down they would certainly have been killed. The explosion took place in the purifying room, but the cause is enshrouded in mystery. No gas was being made at the time. The floor was torn up near the engine and there may have been an accumulation beneath it.

Superintendent Smith arrived at the premises soon after the explosion and made an examination. By six o'clock he had a number of men removing the accumulation and the work was continued all night. Additional laborers will be employed if they can be secured and every effort made to resume the manufacture of gas in the shortest possible space of time. It is expected that the product can again be sent through the pipes on Saturday evening, although it may be impossible to purify it.

The supply was sufficient for all purposes last night, but in places where it is used lamps will be necessary for a few evenings.

It is estimated that the loss caused by the disaster will be about $5000.—March 7th.

When the explosion occured at the gas works on Monday evening, a great many people believed that the manufacture of gas could not be resumed before Saturday. The same impression prevailed among officers of the company. Superintendent Smith determined to make the necessary repairs at once and send out the illuminating product in the shortest possible time. The force of men worked day and night and yesterday the pile of debris was almost removed. Some repairs had to be made upon the shafts connected with the engine and they were begun early yesterday morning. The superintendent told a *Record* reporter on Tuesday that he thought the company would be able to furnish gas by last evening and his prophecy was well-founded.

Yesterday morning the generators were started and a small supply made. The repairs to the shafting were completed at precisely three o'clock. The engine was put in motion and soon began to force the gas into the vast receivers. The employees labored hard to manufacture a supply for use in the evening and succeeded admirably. At a few minutes before six o'clock the gas was turned into the mains. The fact soon became known to consumers throughout the city and the jets in stores and offices again threw forth a brilliant light, although the gas had not been purified. There was general rejoicing and the kerosene lamps were consigned to shelves for use in future emergencies, if any arise. The streets resumed their wonted cheering aspect, and crowds of people thronged the sidewalks.—March 9th.

The work of clearing away the rubbish at the exploded gas works, was so far completed yesterday morning that the manufacture of gas was begun and a good supply was furnished for last evening.

The enterprise of the gas company is to be highly commended. Works all blown to pieces and only one night without gas.

[Official Report.—Continued from page 105.]

Twelfth Annual Meeting of the New England Association of Gas Engineers.

Held at Young's Hotel, Boston, Feb. 15, 16, and 17, 1882.

Mr. Sherman—At the three last meetings of the American Association, held respectively at Philadelphia, Chicago, and Boston, we were entertained with the glowing eloquence of our friend Page, with regard to the future of coal tar and ammoniacal liquor. It may seem to be an exceedingly ungracious task to seek to bring you down from the heights to which he led you to the common walks of everyday life, but ours is an intensely practical business, and until the millennium which he prophesies—when gas shall be a by-product—shall be actually at hand, we must do the best we can with our coal tar, and use it in such a way as to get the most possible out of it. With that end in view I have a few remarks to make on

TAR AS FUEL.

It may seem presumptuous to call your attention to a matter with which you are all presumed to be acquainted. Tar has been used as a fuel from the beginning of our industry. It may seem a great waste to burn a material which has in it such valuable products for the arts; but we must accept the conditions of the market as we find them. The beautiful dyes that are manufactured from coal tar represent principally labor, skill, and capital. Our crude tar bears about the same proportion to the finished products that crude iron bears to the same material when manufactured into watch springs that cost $100 a pound.

The present condition of the tar market shows conclusively that the supply is greater than the demand. It also shows that many managers of gas works either ignore or are not acquainted with its value as fuel, or are too easily overcome by the obstacles in the way of its utilization as fuel. In the present condition of the market for coal tar the only way to get satisfactory returns for this residual product is to consume such a portion of it as will enable the market to absorb the balance at remunerative prices. In my opinion, if the gas companies would hold the price of tar at 6 cents per gallon in their tanks, and decline to sell for less, they would be helping themselves and the dealers. It is due to the fact that tar is valuable as fuel that we are enabled to get any price that would pay for handling it.

The objections made against tar as a fuel are, first, that the smoke arising from its combustion makes a nuisance in the vicinity of the works. This would be a valid objection if tar could not be burned without producing smoke. As it is, it only shows that the tar is being consumed under unfavorable conditions. It is possible to burn tar with as little smoke as arises from a coke fire.

Secondly, it is claimed that a tar fire is more destructive to the retorts and settings than a coke fire. It makes a fierce, cutting flame. My experience has been that with a given degree of heat a tar fire is no more destructive than a coke fire. This experience is backed up by that of others who have used tar for fuel. It goes without saying that a bench heated to a light orange color will not last as long as one heated to a dull cherry-red color. With a tar fire it is possible to get a heat that will melt the retorts and settings, but it is not necessary.

The principal objection comes from the stokers, who are opposed to any change, even though it reduces their labor very materially. They prefer sweating over a furnace than to occasionally adjust the flow of tar to a furnace by a valve. The superintendent who proposes to burn tar must make up his mind for a contest with his stokers, to begin with; they will do all they can in the beginning to thwart his purpose.

Another objection which is raised in some places is that by burning tar they would be adding to their already overgrown pile of unsaleable coke. A sufficient reply to this is that where the coke department is conducted on commercial principles there is no pile to overgrow. Those managers who deliver the coke to their customers broken, suitable for domestic purposes, have no surplus. Their only thought is how they shall supply the demand and get the largest possible income from it, and not check the demand below the point of supply.

There is also an increasing appreciation of the value of coke for making steam. There is a growing and active demand from this source, and in spite of the stereotyped objections from engineers and firemen of stationary engines, users of steam find it to their advantage to use coke. The Springfield Steam Heating Company have ascertained by careful experiment that they can evaporate more water from a pound of coke than from a pound of best anthracite coal. The demand for coke is unlimited; the demand for tar is limited. In many places it must be consumed in the furnaces or thrown away.

For the past five years we have regulated the price of tar by the price of coke. When we could not sell it for its worth for fuel, we have kept it to burn. In this way we have consumed one-third of our make. We find that one gallon of tar is equal to one-half bushel of coke. We have had the best success in burning tar in connection with a jet of steam, and without any coke. We can keep up more uniform heats, and consequently work off heavier charges in a bench heated with tar than in one heated with coke.

I will close this paper with an extract from the American Gas Light Journal, (Vol. 26, p. 2), in which Mr. E. Vanderpool, the able engineer of the Newark Gas Light Company, has a paper on tar as fuel—a paper replete with scientific and practical information in regard to liquid fuel, particularly coal tar. In this paper Mr. Vanderpool shows that 1.90 gallons of tar are equal to 2.20 pounds of coke. He closes his paper by saying:

"The following are some, and probably the principal reasons for the superior efficiency of tar fuel:

"1. The combinations of combustion are more perfect.

"2. The waste from incomplete combustion is less.

"3. The infrequent firing prevents the cooling of the furnace and settings by blasts of air.

"4. There is little loss of fuel during clinkering, while with coke the loss is large."

I understand that Mr. Vanderpool continues to burn in his furnaces all the tar produced in his works.

Discussion.

Mr. Stedman—I would like to inquire of Mr. Sherman whether Mr. Vanderpool uses tar simply, or does he use it in connection with an injector of some kind.

Mr. Sherman—He uses it with an injector.

Mr. Allyn—What form of injector do you use?

Mr. Sherman—The same form that he uses. I inject the tar in connection with a jet of steam.

Mr. Lamsom—What price do you get for your coke?

Mr. Sherman—At the present time we are getting 8 cents per bushel in the yard. It is broken up for domestic use.

Mr. Lamson—We are not able, here in Boston, to induce people to burn crushed coke with any great success.

Mr. Sherman—The great utility of it is for steam purposes. It is cheaper than anthracite coal.

Mr. Lamson—We sell great quantities for steam purposes, and have spent a great deal of time and trouble in getting people who have boilers to use coke for making steam.

Mr. Yorke—My opinion, derived from my experience, is about the same as Mr. Sherman's with regard to the comparative value of tar and coke. I have been using tar for several years. About four years ago, when we commenced using it, I had no idea of making more out of my tar benches than out of the ordinary coke benches. I use about 70 gallons of tar, and the yield of gas is about 30,000 feet per bench. During the past winter I found that by increasing the amount of tar, it is just as easy to make 9,000 feet to the retort as it was to make 6,000 with the coke. Of course, we use rather more tar and rather more coke in the same bench; but we have during the past year made, with three benches of tar, over 47,000 feet to each bench of five retorts: and the combustion is perfect. You can burn almost any amount by giving it the requisite amount of oxygen. For instance, if we wish to increase the heat, we give a little more tar and open the furnace door. If it shows any blaze going up the chimney, we open the furnace door a little more, until the blaze ceases to come out. In that way we secure perfect combustion.

The President—How do you use the tar?

Mr. Yorke—We use an injector. It is forced in with the steam.

Mr. Sherman—Is it a patented injector?

Mr. Yorke—No; it is not patented.

Mr. Stedman—Do you superheat the steam?

Mr. Yorke—No; we pass the steam pipe over the chimney, but I do not think it superheats it much.

Mr. Allyn—About how many gallons per day do you consume?

Mr. Yorke—I think we can run two tar benches and one of coke. That is, if we had three benches in connection, we could run two of them with tar.

Mr. Allyn—The tar from the three benches will run two of them?

Mr. Yorke—Yes; I am not certain that it would quite keep them going, but I think it would. I measured my tar and then, three or four weeks afterward, I measured it again; and my man made it out that the tar well had fallen about one inch.

Mr. M. S. Greenough—Do you use the tar with coke, or tar alone?

Mr. Yorke—With coke. When firing with a moderate heat, we close up the ash pan entirely, and simply have a little bed of coke on the grate bars. I use just about as much tar as can be consumed without extra ventilation. I use about 70 gallons per day, as near as I can measure; sometime it would be 75 gallons per day.

Mr. Andrew—Do you find that you get better heats by using the tar?

Mr. Yorke—I get better heats. I could make 12,000 feet per retort by charging it as high as the other.

Mr. Andrew—You are satisfied that you can get more gas by tar burning than by coke burning, if you should charge your retorts?

Mr. Yorke—Yes; I have no doubt of it. I have never charged my retorts in that way, because we do not need the amount of gas; but I think it can be done. I do not think, though, that there would be any money in thus charging the retorts. The wear of the retorts would be greater.

Mr. Andrew—You made a statement before the Guild that you made 7,000 feet to the retorts, and had an idea that next winter you could make 12,000 feet to the retort.

Mr. Yorke—Yes, by charging every three hours.

Mr. Sherman—In regard to the value of coke for steam purposes, I will say that our late friend Dwight made some very careful experiments with regard to the value of fuel for steam purposes, and the result was that with coke he could evaporate a quarter of a pound more of water per pound of fuel than he could with the best Lehigh coal. He preferred to burn his coke, or to convert it into steam, rather than to sell it for 9 cents per bushel. The former price had been 10 cents per bushel. Previous to going into steam heating he had sold it for 10 cents per bushel; but after going into the steam heating business he was indifferent about selling it for 12½ cents. That is the way that coke, in his opinion, compared with other fuel.

Mr. Coggshall—This matter of fuel is a very important question until we have some additional outlets for the sale of tar. The difficulty which I found was in adjusting the oxygen for the consumption. If I undertook to increase my stream of tar, I immediately had a column of smoke going out of the chimney, and the heat would go down. If I used it in connection with coke, I had the same trouble. I would like to ask Mr. Sherman whether he closes his draught underneath the grate bars completely or not.

Mr. Sherman—I completely close them.

Mr. Coggshall—Where do you introduce the oxygen?

Mr. Sherman—At the sight-hole over the furnace door.

Mr. Coggshall—Mr. Yorke says he opens the door if he wants to increase the stream of tar. If I should do that I would have flame going out of my chimney.

Mr. Yorke—The sight-hole immediately over the furnace door is about five inches square; that is all there is open. If we use a small quantity of tar—say about enough to carbonize a charge of 900 pounds to the bench—a hole that size will admit oxygen enough. If I want to increase the heat I give more oxygen by opening the furnace door.

Mr. Coggshall—I have sometimes filled my ash pan with water, so that no atmosphere could get in under the grate bars; but I can consume only just about such a stream of tar.

Mr. Sherman—Do you burn in connection with steam?

Mr. Coggshall—Yes.

Mr. Sherman—We do not use any coke.

Mr. Coggshall—You use breeze, do you not?

Mr. Sherman—No; we do not open the furnace door at all.

Mr. Coggshall—The tar makes breeze enough in the furnace.

Mr. Sherman—Yes; I pull out the grate bars, fill up with breeze, have no draught at the bottom, and bank it up around the door.

Mr. Coggshall—Do you have any opening in the furnace door?

Mr. Sherman—No; none at all.

Mr. Coggshall—Only where you introduce the tar?

Mr. Sherman—That is all. Mr. Rollins has had the same experience as I have had, and we would like to hear from him.

Mr. Rollins—I have tried perhaps twenty-five or thirty different arrangements for burning tar. The one with which I have been most successful is somewhat the same as that which Mr. Sherman uses, although at the present time I use tar and steam entirely separate. That is, I have a little jet of steam just over the top of the furnace door. I do occasionally have a little trouble with the smoke arising, notwithstanding the watchfulness that is required of the men. When it is adjusted properly there is no smoke; but then perhaps in a few hours it is as bad as ever again. I take out the grate bars and close up as tightly as possible at the bottom.

Mr. Sherman—We superheat our steam, and consider that essential to success.

Mr. Allyn—What has been the durability of your retorts as compared with the use of coke?

Mr. Sherman—We have never put it into new benches. We put it into a bench after it has been in use some time. We do not see that we have caused any extra expense for retorts by the use of tar.

Mr. Rollins—I do not use any coke when I use tar. I use nothing but tar, and it takes from 86 to 95 gallons of tar to a bench of fives.

Mr. Sherman—We burn 120 gallons of tar to a bench of sixes.

Mr. Scott—Do I understand you to say that you superheat your steam?

Mr. Sherman—We superheat the steam; but that is done without expense by passing it over the flues.

Mr. Nettleton—It seems to me that there can be very little trouble in burning the tar and getting the heat. There may be some trouble in avoiding the smoke. The most of us are so situated that even if we make smoke we will not be complained of very seriously. It seems to me that the principal part of Mr. Sherman's paper is being overlooked. If we can burn a certain proportion of our tar—say one-third or one-half—we can sell the rest at higher prices. If the people who buy the tar know that we are in a position to do that, they will be willing to pay higher prices for the tar. I have had just that experience. For a town of the size that I am supplying with gas, there are a great many tar walks laid; and those doing this work, several years ago, insisted upon bringing down the price of tar. I insisted upon keeping it up at the old rates; and the consequence was that they refused to buy of me, and sent out of town for it and paid a higher price than I asked. But they have finally come round, and are to-day paying me $3 per barrel. I do not mean, after this, to sell my tar for less than that price. If they refuse to take it at that price I will burn it. If we burn the tar we have the coke. What shall we do with the coke? Most of us are supplying it for manufacturing purposes. It seems to me that it would be a good idea for each one of us to state the uses that are made of coke in the different towns. With me, it has been used successfully for two purposes; one is in the corset shops, where they heat the slugs that go inside the irons for ironing corsets. For years that was the only purpose for which we sold coke to the manufacturers. Recently I have made quite a large contract with a brass mill for the use of coke in muffles. These are large ovens, in which the metal is placed in order to heat it for the purpose of tempering. Previous to using coke they used wood; but for certain classes of work they find that coke is more economical at 11 cents per bushel, delivered in their yard, than wood. At the present time wood is selling for about $5 per cord, delivered in the yard. If any of you gentlemen have brass mills in your towns, you can sell some coke in that way. If the brass mills should at any time refuse to take the coke from me, I should then try to sell it—and in fact I have sold it—to iron bolt men, who use it for heating the short bits of iron that they use in welding the heads on the ends of bolts. Very likely some of you have had some experience in that line, and can indicate to me some other field into which I might push in endeavoring to make a future sale of coke.

Mr. Spaulding—I wish you could discover for me some market for my coke. I have burned tar until I have got my yard filled with coke; and I am paying from 50 cents to $1 per foot for land to store it on. I have had to stop burning tar, because I have got a yard full of coke. I cannot sell my tar. I can only get $1 per barrel for it. I have no brass foundries or iron foundries; nor is there anybody else whom I can supply with it. I find that it makes a great difference, where we are located, whether we can sell our coke or our tar. While my friend Mr. Cushing is able to sell his coke in Lowell for $4 per chaldron, I endeavored yesterday to sell 500 chaldrons for $2 per chaldron, but was unsuccessful. Neither can I burn my tar. I do not know where I could get $1 per barrel for tar. I cannot get $2 per chaldron for coke, and not over $1 per barrel for tar. I do not know which to burn. I would like to burn the tar; I have had good success in using it. I have what is called the Rollins burner; and it is an excellent thing. I can get a better heat and better results in every way from my tar burner, if I could only sell my coke. That is something I cannot dispose of; neither can I dispose of my tar. While some of you can sell your tar at $3 per barrel, and some of you can sell you coke at $4 per chaldron, I am in such an unfortunate position that I cannot sell my coke for $2 per chaldron nor my tar for $1 per barrel. I wish some of you would help me out of my difficulty, if you can.

Mr. Yorke—I think I can help you out. The Portland Gas Light Company will give you $1.60 per barrel for your tar in Portland.

Mr. Spaulding—What is the freight to Portland?

Mr. Yorke—Fifty cents.

Mr. Stiness—I am situated like my friend Sherman. We can dispose of all our coke at 7 cents per bushel. There is a demand for all we make. It is used mostly for steam purposes. The subject of the proper disposition of our waste products is one of great importance to all of us. On Monday morning a gentleman who carries on a large foundry in Providence called at my office and desired to know if I had any carbon on hand. I am happy to say that I manufacture but little of that article, and was not at the time overburdened with carbon. But there has been discovered for it a new use. I will give it to you as it was given to me by this foundry man. He told me that it has been discovered that in a cupola furnace, by placing a layer of carbon over the fuel which starts the fire to melt the iron, it soon forms into a mass, and prevents any iron from passing through, and is, in that way, a great benefit to all founders. He desired me to furnish him with every pound of carbon that I had or could get; and said that he would

pay more per ton than for the very best Lehigh lump coal. If any of you gentlemen have any carbon to dispose of, you can find a market for it with the iron founders, if you can only induce them to try the experiment of its use. I may add that for several years I have consumed all the carbon I have been able to make in my own house furnace—every pound of it. I would pay more per ton for carbon than I would for the very best coal that was ever put into my cellar. I think that if any of you gentlemen have any carbon, and are unable to dispose of it to the foundry men, you had better try it in your furnaces at home. You will find that it is far superior to any coal.

Mr, Stedman—What my friend Stiness has said about carbon as fuel is fully corroborated in my own experience. I was at one time at the house of Mr. Stiness, and he was alluding to the advantages of carbon as fuel. He went down cellar and came up again, and presently I heard a tremendous cracking and snapping in the lower regions; it seemed to me that the cellar was about to be shaken to pieces. I asked him for the explanation, and he said that that was simply the carbon taking fire. I suppose if there is no objection to having a new furnace once in a while, there can be no objection to using carbon as fuel. I followed his example and went home and tried it—a thing I rarely do, because it is not always safe to follow in the line of his experiments. In this instance I cracked up some carbon and put it in a furnace for the production of steam. Of course it had to be broken a little finer than for an ordinary hot-air furnace. I assure you it made a very admirable fuel. The combustion is very nearly complete; it leaves very little or no ash. It is as near a perfect fuel as anything in the solid form can well be. I have satisfied myself that it is a very valuable and cheap fuel. But I also found that no one but myself could keep a fire with it. If I trusted to the servants, they let the fire go out; and so I concluded to sell the carbon and buy coal.

Mr. Nettleton—As most of you know, I have been buying more or less carbon. I will give you the points that I have found out about it. I use in my own furnace all the carbon produced at the gas works of which I have charge. I have never had any material which gave such a satisfactory fire. I control it by means of one of the good things that came from Boston—the Norcross regulator. If Col. Stedman will put that on his furnace, I think his servant will be able to take care of it. At the Beckton works, in England, I understand they use all the carbon that they produce in their own foundry. They like it so much that they will not sell a pound. In this country it is occasionally used in foundries. The only other uses made of it is for carbon points for the electric light, and carbon plates for telephones. As the demand in those two directions is rapidly increasing, I think the consumption will very soon reach the supply. Then carbon will not be considered a useless residual, but will bring in quite an income to each one of the gas companies.

I feel so strongly on this subject of using coke for different purposes that I would like to test the sense of the gentlemen present by moving that a committee be appointed to correspond with the different managers in this Association, for the purpose of ascertaining the various uses to which coke is put in the different towns, and the uses for which it is sold. If used in brass foundries, let them ascertain how it is used; if used in iron mills, let them ascertain how it is used there; and let the knowledge be disseminated by the committee of managers, so that in case any of us get a supply of coke, and happen to have a factory near at hand at which it can be used, we may know what steps to take to secure its introduction and use. I therefore move that a committee of three be appointed by the Chair for that purpose.

Mr. Sherman—I second that motion. The information which such a committee could gather would be very valuable to all of us. When I first went to New Haven we could not sell coke for $1 per chaldron; but, from the present indications, we shall never again have a glut of coke in our yard. The only trouble now is to supply the demand.

Mr. Cabot—I would like to suggest to those gentlemen who experience difficulty in selling their coke, a course which I have taken in times past when we had coke to sell. We *advertised* in every paper in the city; and also put placards around stating that we had coke for sale, and that it was cheaper than any other fuel in use. Such advertisements generally meet a ready response in a demand for coke. I think that advertising is a very good way of letting people know that you have something to dispose of.

The President—At what price do you sell your coke?

Mr. Cabot—We are now getting $5.25 per chaldron. We break and deliver all our coke. I found great advantage in advertising in the papers and by placards, thus keeping it before the people all the time.

The President—In comparison with that, what is the price now paid for ordinary hard stove coal?

Mr. Cabot—I cannot state that exactly, but I think that furnace coal is now selling for $8 per ton.

The motion of Mr. Nettleton for the appointment of a committee was agreed to, and the Chair appointed as such committee Messrs. Nettleton, Sherman, and Stedman.

Mr. Boynton—I would like to ask Mr. Sherman what he considers tar worth per gallon.

Mr. Sherman—That depends upon the price of coke; we are governed entirely by the price of coke. If coke sells for one price, tar is worth so much; if at another price, it is worth so much. If coke is worth 8 cents, tar is worth 4 cents per gallon. That would be $2 for a 50-gallon barrel. That is the only thing that we are independent about, or in any wise inclined to be stiff about, in our business. I think that one gallon of tar is worth half a bushel of coke for fuel.

Mr. Boynton—I sell my coke at the rate of 12 bushels for $1, and my tar at $1.50 for 40 gallons. Would you advise me to burn my tar?

Mr. Sherman—That is too cheap. You ought to have 4 cents per gallon for your tar.

Mr. Boynton—At less than that, do you think it is worth more to burn?

Mr. Sherman—That is my view of it.

Mr. Boynton—That is, if you can sell the coke.

Mr. Sherman—In most places you can sell the coke. My friend from Brookline is peculiarly situated. He has no manufactories to take the coke. I used to experience the same difficulty; I used to cart the coke to Roxbury to sell it.

Mr. Cabot—If there is no other matter now before the meeting, I move that the thanks of the Association be tendered to Mr. Stiness and to Mr. Sherman for the very valuable papers which have been read at this meeting.

The motion was unanimously agreed to.

Mr. Stedman—I move that the thanks of this Association be also extended to the Committee on Statistics for producing the valuable paper which has been read before us by them.

Mr. Stiness—I rise with great pleasure to second such a motion as that. There is but one word to express the arduous labor which has produced such a paper as that—it was indefatigable. But still, as I look at it, I do really feel sad that with the amount of money invested in the gas business in New England, and with the intelligence that is represented here to-day in this Association, a paper of no more value to us as gas men can be presented. I hope that the thanks of the Association will be tendered to the Committee, and that their labors will be continued. But I am afraid, judging from the limited information contained in the paper this year, that next year the information will be confined to a single column—that which gives the names of the managers. If so, I hope the names will be printed in the most æsthetic style. Let the names be printed in green and gold, so that we can cut them out and use them for door plates, if they can be used for no other purpose. But I am surprised to find that right in the center of that list, where the post of honor is, and where our standard should be unfurled, there is a blank. But perhaps, as there is a silver lining to every cloud, it indicates a pathway which we may silently follow. I trust that is the case I call no names; but I see a blank; I regret it. I had hoped that the giant-hearted friend whom we are always glad to welcome here would have sent us figures, which we might follow in the distance, even though we could not hope to compete with them.

But, gentlemen, this is a serious matter with me. I am informed by the Chairman of the Committee that there are many members of our Association who decline to answer the questions put to them by the Committee because unfair uses are made of the information given; but I stand here and assert that if the members of the New England Association of Gas Engineers will answer the questions proposed to them, the information will be as sacredly kept as are the answers to any questions put to us or asked by us within the precincts of our own works. I know that in this matter we are making history every day; and it is of the utmost importance that we should put indelibly upon our records the history of our transactions as they occur. We care nothing about many of the private details of the different works; and I do not believe that any man who honorably bears the name of gas engineer will make undue or improper use of any figures which he may receive from any of his associates. We do not stand in competition one with another. I like the good old word which Col. Stedman has so often used; it is the give and take problem in this Association which we have got to come down to; and the sooner we come down to that give and take problem the sooner we will arrive at the solution of that decimal problem—which I believe is not in the dim future; I believe that it is coming; and God speed the day when it will come. But if we are to grovel in darkness as we are doing to-day, it is still a good way off. For my part, I will give any information that I may have to any honorable man, and he is welcome to make the most of it. I will do all in my power to aid him. I do hope that the modesty of that Committee will not compel them to cease in their efforts to get answers to the questions which they have propounded. I second the motion of Col. Stedman.

The Secretary—I would like to ask the name of that Committee. Am I one?

Mr. Stedman—I think not, except *ex-officio*. I made my motion, Mr. President, not in any serious sense, because, as I am Chairman of the Committee, it would have been wholly improper for me to do so. I desired to bring the subject up for consideration, and as we were tending toward the facetious, I put it in that way. I really think the labors of the Committee ought to be extended, if possible, or else the Committee should be discontinued. After the publication of the full statistics which we prepared two years ago, there was a good deal of feeling that improper use had been made of them; but that improper use was mostly confined to copies that were sent outside of members of the Association. That is to say, the complaint that was made here in the meeting that succeeded the issue of those statistics, arose solely from the fact that reports had been obtained outside of the regular members of the Association, all of whom had been pledged to secrecy and reticence about them. Since that time the Committee have been unable to induce any very great number of members—and especially very few of the prominent members—of the Association to send in their statistics in answer to any very close questions. We think this year that, merely as a matter of passing record, the prices at which gas was sold in the different cities and towns might be of sufficient interest to warrant the printing of such statistics as we have compiled. I would be very glad to be continued on the Committee, and to do as much as I am able in order to obtain as valuable a table as we issued two or three years ago. That table was certainly very full of desirable information. The answers which were then furnished to our questions gave information which was of very great value to all of us. But, as we found that it was impossible to duplicate it and extend it in future years, we were driven to the necessity of issuing the very small list of questions which were sent out this year. I think it is a matter of importance that this compilation of minor statistics should be continued, and that they should be tabulated each year for the benefit of the Association. Unless this is done I think the Committee had better be discharged. If the Association thinks best to so manage it that a larger and more enlightening series of answers can be obtained from the members, then I shall have no objection to serving on the Committee longer. I have no doubt that the other members of the Committee are equally willing to serve. But it seems to me that we have now served the good purpose for which we were appointed, as far as we can at present; and that for the future the labors of the Committee had better be discontinued.

Mr. Spaulding—It seems to me that unless there can be a more enlightened paper prepared and presented to the gas engineers, it is useless to continue the efforts of the Committee. When I received that paper I said to myself and to my assistants that I thought it was a cheap affair. Anybody could answer the questions put. So far as I could see, there was no benefit to be derived from them. Unless we can manage to get up something that will be interesting and instructive, I hope we will drop the thing entirely; because it is a perfect "give away." As I look at it, it is a shame for a class of men like ourselves to attach our signatures to a paper of that kind. I hope that in the future we may be able to do something that has a little more sense in it—that goes a little deeper into the merits of the question, and from which we can derive some benefit.

Mr. Neal—I think I am on that Committee, and if so I would like to be discharged. I think it would be well to discharge the whole Committee.

The President—I hope the Committee will not be discharged, but that they will continue their efforts.

Mr. Stiness—I desire to make a motion, and I do it with a deep feeling of the conviction of duty which we owe to ourselves. I move that the Committee be continued, and that they be requested to prepare a suitable list of questions by which the practical results of the workings of the various gas companies in New England can be obtained. I would also add the proviso that this Committee—able and intelligent as I know it is, and whose labors have always been so courteously performed—find that they are unable to get answers which are satisfactory to themselves, that they omit the publication of any report. I know that the record obtained will not be one that we need be ashamed of; but nevertheless, if the Committee find that the statistics furnished are not of a character commensurate with the importance, worth, and dignity of the New England Association, let them exercise their discretion in withholding them from publication. My motion is that the Committee on Statistics be continued, and be instructed to prepare a list of additional questions, and tabulate and publish the answers received so far as they may deem it expedient to do so.

The motion was agreed to.

On motion, the time and place of holding the next semi-annual meeting, and the making of arrangements therefor, was referred to the Board of Directors, with power.

Mr. Sherman—If the discussion on the coke question is not closed, I would like to have our honorable friend from Indiana, Mr. Starr, give his experience and a statement of his manner of handling coke. If I remember rightly, he comes the nearest to making gas a by-product of any man among us.

Mr. Starr—I have been burning tar for nine years. By calculation, when selling coke at 13 cents, I thought it worth $4 per barrel. I have not sold a barrel of tar for less than $4 for nine years. I do not want to sell any tar. I have several times tried to buy tar to heat my furnaces with. I will admit that in this warm winter there has been a larger amount of coke on hand than I thought was desirable, and I have, consequently, been burning coke instead of tar. Heretofore I have sold the coke and burned the tar I use about 60 or 80 gallons of tar per day to a bench. I use some coke with it. I find some of the results that have been spoken of here—for instance, that by opening the door, or giving a large increase of air, we check our smoke. Our benches are about five by eight. We could not get along at our place without the tar; we could not make the gas that we want. I am glad to hear that other parties are entertaining the same idea. When they get 30,000 feet per day out of a bench of five or six retorts I think that is about as good as they can hope to do. Certainly, 40,000 is a good yield. With tar we can get almost any amount we want. I was, at one time, hard run by the demand for gas and a scarcity of benches (when we were setting a bench and had not got it quite ready), and with a bench of sixes we ran, as a regular day's work, from 57,000 to 69,700 feet for one bench. I told the men to stop at that, as I was afraid that something would break. Our retorts are 14×24, and 9 feet long. We use the Alleghany coal. We use some cannel coal as an enricher, I think from 6 to 10 per cent. I do not strive to get as much gas per ton as many of my neighbors report doing. If I get from 4¼ to 4½ I am satisfied. I try to furnish from 18 to 20 candle gas. I use four-hour charges. I have had some rough experience this Winter. I think I have lost my grit. There is nothing I dislike more than to set a bench of retorts, but I have always superintended it personally. I do not seem to be able to get any one else to do it to my satisfaction. Last Spring I thought I could get along with two benches. I had run through the Winter with only two benches, and they were in very good shape. Our largest run was 60,000 per day on the two benches. One has five and the other has six retorts. They have been running now for three or four years each. Our retorts get gray-headed before they wear out. If you give us tar we will do anything with them, and do it as long as you want it done. I esteem tar very highly as a fuel. I lowered the price of gas a year ago last fall. And, by-the by, I am in favor of low-priced gas. You make friends by lowering the price of gas. They will absolutely love you if you lower the price of gas. We are now furnishing it at $2.

Mr. Spaulding—My people did not love me much at that price.

Mr. Starr—We commenced several months ago to sell gas at $2 per thousand. I encouraged them all to change their burners and gave them larger burners instead of smaller ones; and I found that last December my increase in consumption was about 50 per cent. over the December previous, and in January it was 30 or 40 per cent. over the January before. Until December a complaint was unheard of in our office. We scarcely had any compaints. I often made the remark that selling gas in our town was almost as pleasant as keeping a gift-store. But last December we had a pretty rough month, and the bills were pretty high; however, I lost but two customers, and they will be back again before Spring. I am burning coke now in a different way from what I ever did before. I guess Mr. Neal heard me speaking of it in October. I was then fixing up a furnace to take the waste heat off of the chimney and off of the benches. I have a fan that drives the air into it. The air, when it comes into the pipe, is not red hot, but it is too hot to bear your hand on the pipe. The fire is very bright and very intense. When down to four or six inches on the grate bars the men cannot face it without having colored glasses on to protect their eyes. I have only one bench fixed this way as yet. I am going to fix them all in that way by-and-by. Instead of running with the flue open from 8 to 10 inches, to give a draft, I close it up to half an inch. I force the combustion down below, and keep it in the furnace. You scarcely ever see any fire or blaze going out of the top of the chimney. I have experimented with it, and noticed what fuel it took by charging it with the coke right out of the retorts. They took the two bottom retorts, and that will keep the heat up; but it did not do anything more than that. I, therefore, consider it a very great saving. Where we used to burn 50 or 60 bushels of coke per day, to fire up six retorts, we have now got it down to 15 or 20 bushels, and use 60 gallons of tar. That gives us an excellent yield.

Mr. Andrew—What is your experience in using tar in a new bench, as to durability, as compared with coke?

Mr. Starr—We always put the tar in as soon as it gets hot. We do not hesitate on account of the state of the retorts; I frequently heat up in less than three days. Last Fall I had to hurry home from the Convention on account of delay in getting material. The night I got home they had been fired about twenty-four hours; that night the angle-iron of the holder was under water, and after forty-eight hours we commenced making gas.

Mr. Andrew—How much longer do your retorts run when burning coke than when burning tar?

Mr. Starr—I do not know; I think the longest I have burned them is five years.

Mr. Stedman—Does Mr. Starr mean to say that he made 69,700 from one bench of fives?

Mr. Starr—No: from one bench of sixes.

Mr. Spaulding—If Mr. Starr will tell me from whom he gets his gray-headed retorts, which last for five years, I would like to present the man with a chromo.

Mr. Starr—I get them from G. C. Hicks of Chicago. He used to be in Baltimore, but is now in Chicago. I say for five years; but we almost always fire up the bench in September or October, and 4½ years after that I rake the bench out and put in a new one. I called that five years. I generally run from 3 to four years.

Mr. Andrew—You say from 64,000 to 67,000 to a bench of retorts; how many pounds of coal do you use to a retort?

Mr. Starr—I do not now recollect. I have not got the figures with me. I think there were 350 to 375 pounds to the retort. Our retorts are 14×24 and 9 feet long.

Mr. Spaulding—I can understand partly where Mr. Starr gets the durability of his retorts—from the fact that he only gets 4 or 4½ feet to the pound. If he would run the retorts up to a high heat and get 5½, or a foot more, to the pound, I think the durability of his retorts would be less.

Mr. Starr—I think so too.

Mr. Spaulding—That makes a great difference. When he gets 4½ or 4½ the retort will last much longer than when he gets 5½ or 6 feet to the pound. I believe the point has been reached by some of our friends here of 6 feet to the pound. I think Mr. Stedman has done that.

Mr. Stedman—Oh, no; not at all.

Mr. Starr—When you reach 5½ you get one foot of gas that is not worth anything. It may do to enrich oil gas; but, as an illuminator by itself, I would not give much for it. I would not do without tar for anything. I have been sometimes tempted to buy tar and burn it under the retorts when we did not make enough. This last Winter, near the latter part of the year, I had quite a serious time. Our demands for gas had increased so much that it was difficult to make it; our purifiers being small we were obliged to use pretty heavy layers of lime on account of the great amount of gas.

We had a great deal of trouble with the gas going out. Our tar stood us in good need then. I hunted for naphthaline, and for everything else, and finally concluded that our purifiers were too heavily laden with lime. I then went to the lumber-yard and bought several hundred feet of lumber, cut it off into eight feet lengths, and went to making wood gas. When I got so short of gas that I found that after seven o'clock I only had the gas I was making, and had a light holder, I would fill up with cannel coal and give it to them rich; in that way I got through.

The President—Do you weigh the coal into your retorts?

Mr. Starr—We weigh the coal into the retorts. I have a scale, that is on wheels, and the box is on that. That is the cart for the coal. We pull it out into the coal house and load it. I have a set of weights that weigh 100, 125, 175 and 200 pounds. When I was charging with 300 pounds I would just put on the 200 and the 100 pound weights, so that the men would not have to use the weight on the beam of the scales at all; that made it very handy for them.

Mr. Nettleton—I would like to ask Mr. Starr how he handles his coke. He has, I think, the ideal method of handling coke.

Mr. Starr—I have my retorts set with a track along by the mouth of them, throw the coke out of the retorts into the car and then run it into the coke-house. The floor of the retort house is eight feet above the coke-house. In the cellar we have our coke crusher, and twice a day we break our coke. It takes a-half or three-quarters of an hour to break it. It is broken there and then goes into the elevator and is hoisted up into the garret of a two-story house. It goes up nearly three stories. It is there tilted off into a revolving screen, with a flat screen under it, and it is then separated into four kinds of coke; first, the dust; then the pea or the nut coke, used by the chain makers; then the small nut, used by the base-burners; and then the larger coke, which is excellent for grates.

Mr. Nettleton—Do the carts back under the elevator to receive the coke?

Mr. Starr—Our pea or nut coke is shot from the roadway into the carts. I have a car which takes the other coke into another house holding about 20,000 bushels. There is only one handling of it.

Mr. Nettleton—How much dust do you get?

Mr. Starr—I have tried to find out several times. I think there would be half a bushel of dust out of 25 bushels of coke,

Mr. Nettleton—What kind of a crusher do you use?

Mr. Starr—One of my own make. I put in 25 bushels of coke and get out 24½ bushels of coke for sale. There is one-half a bushel of dust; and I use my dust by mixing one third Alleghany coal and two-thirds coke-dust for the boiler.

Mr. Spaulding—I saw that my friend Starr's retorts are of about the capacity of those I use. I put in a charge of 250 pounds, and I find that when the coal is properly carbonized and ready to draw, it is difficult for my men to get their rake in and pull it out. Putting in, as he says, a charge of 350 to 400 pounds reminds me of the story of the Irishman who took his keg to a saloon to have four gallons of beer put into it. It would only hold four gallons, but they charged him for five; and the Irishman said, "Be Jabers, I would as soon pay for five gallons, but I don't like to have my keg strained in that way." (Laughter.)

Mr. Starr—I admit all that. I think that 250 pounds is as much as ought to be charged in 14×25; but you can get in more if you level it off properly. If it is not leveled off properly it will swell and fill it up tight. If he only charges with 250, and has trouble to get his rake in, I think he must leave a hollow at the back which is unoccupied. We have a leveler, and we always put it in and level the coal.

Mr. Stedman—How much coke do you get for sale out of 25 bushels crushed?

Mr. Starr—I get 24½ bushels. That is only 2 per cent. of loss. I know that nobody will admit it but me. I will get, say, 22½ bushels of large nut, suitable for stoves; then I get 1½ bushels of pea or nut coke, for which I get 15 cents per bushel.

Mr. Stedman—In our experience we find that the larger lumps of coke, when they first come out of the retort, measure up pretty well. If the coke is not burned very hard, the lumps will be large; and we have no difficulty in measuring 40 bushels. At other times the lumps will be smaller, and we can only get 36 bushels from the same charge. Then, if we put that under the crusher, we find that there is a shrinkage, from the fact that the smaller coke lies more compactly in the basket; and we cannot get so many bushels from it in consequence. We once tried the plan of using different baskets for the crushed coke, but we found that that did not work very well; our consumers were prejudiced in favor of the larger baskets, and when we sent the coke out in smaller baskets they claimed damages, and we found that our coke sales were diminishing.

Mr. Star—I think there is a great deal of difference in the effect of crushing our coke. I used to have a crusher with ridges running lengthwise on the cylinders. I never made them more than 18 inches long. The result was that the coke would be caught between two ridges, and be mashed all to pieces. I tried to get up something that would prevent that, and I got up what I call my star wheel. It does not mash the coke to powder. That is the reason I have less dust than others—because I split the coke up.

Mr. Stedman—We have a crusher somewhat similar. There are stationary teeth in the bottom of the box, and between those teeth revolve the teeth of the cylinder. As the cylinder revolves the pieces of coke get a blow, and are cracked instead of being crushed. We get a very small amount of dust, comparatively; but, at the same time, we have the inevitable consequence that packing the pieces closer together reduces the bulk; and we have a loss of 10 to 12 per cent., not from the waste of coke, but simply from the fact that when we measure up everything that we have left, there is a loss of from 10 to 12 per cent. We run 50 revolutions per minute.

Mr. Starr—Mine only runs 40 revolutions per minute.

Mr. Stedman—It may be that your crusher, in some way, obviates the necessity of putting the pieces closer together.

Mr. Starr—We find that coke an inch in diameter is the best size for our stoves.

Mr. Stedman—We increased the sale of coke to our consumers by crushing it. Nineteen-twentieths of all that we now sell is in the shape of broken coke.

Mr. Starr—I break all my coke. I do not believe that I could sell one bushel where I now sell one hundred if I did not crush it in that way.

Mr. Stedman—I think that the better the coke can be prepared for domestic uses, the more rapidly it can be sold.

Mr. Starr—With us, coke is the cheapest article of fuel. I have been told by customers that they could not afford to burn coal when they could get coke. With coal at $7.80, and coke at 15 cents per bushel, the coke costs 6 cents per day and the coal 14 cents. That is the report of a customer as to the relative cost of coke and coal.

The Association adjourned until 10 o'clock to-morrow morning.

SECOND DAY—FEB. 16.

The Association met at 10 o'clock.

RETORT FURNACES.

The President—The subject assigned for discussion this morning is that of Retort Furnaces. It is a subject that ought to call out considerable discussion. There have been many attempts in the past few years to improve

the construction and effectiveness of the furnaces heretofore in use. A departure from the old style furnace in New England has led to the adoption, in many places, of the Dieterich furnace. Several gentlemen present have had considerable experience in operating this furnace. From all that I have learned up to this time, the experience has been quite variable. In Providence we constructed eight Dieterich furnaces, and they have now been running for a year and three months. Our experience has been very satisfactory; so much so that we do not propose to build any more of the old-style of furnace. While we do not suppose that the Dieterich furnace is the best style that can be adopted, yet we propose to use them until something better is introduced. At the annual meeting of the American Gas Light Asssociation in October last, I presented some of the results that had been obtained up to that time; and you are probably all familiar with them. There are several gentlemen here who have been using the Dieterich furnace. Perhaps, however, we had better first ask for the experience of those who are using the ordinary furnace. There has been a gradual progress and improvement in the results obtained from those furnaces. I think that Col. Stedman has done as well with the ordinary furnace as any gentleman that I know of, and we would like to hear from him as to the results which he has obtained.

Mr. Stedman—I am not aware that I have ever done anything very remarkable with our furnaces; and we feel less inclined to brag about them since our friend Starr, from Indiana, has given us his experience. It was thought by some of the gentlemen at the October meeting that our results were pretty well up; but at that time Indiana had not been heard from. We use a setting that might be designated as a bridge-wall setting. The furnace is 14 inches wide by 4½ feet long. A bridge wall is built at the back end of the furnace, and extends, closely fitting the retorts, to the top of the retorts. The bridge wall is built even with the back end of the furnace, and extends up to the top of the retorts, so that all the products of combustion have to pass, in the first place, up to the top of the bench, then over the bridge wall, then down back of the bridge wall, back of the retorts, and into the waste flue at the bottom, and then it passes forward, under the two bottom retorts, and back under the same retorts by means of a division wall in the lower flue, placed parallel with the line of retorts. We have found that very efficient in producing a very high heat with a moderate consumption of fuel.

The President—You have what is called the "return flue?"

Mr. Stedman—Yes. We get the best results from those settings when we are making the maximum production. Probably the average in fifteen days of September would be about 115,000. It did not vary far from that figure. That was produced with two benches of sixes. At that time we used 120 bushels of coke in two benches, or 60 bushels to each bench. That gave us a result of very nearly a bushel of coke to a thousand feet of gas; which is pretty good work for the old style of furnace. Of course, with the regenerator furnace we expect better results than that, because there is an unavoidable waste caused by bringing in unnecessary quantities of air in the ordinary furnace, with the strong draught that is necessary to produce the intense heat to make that quantity of gas. We like the same setting just as well for more moderate work, except, of course, the relative proportion of fuel to gas produced is increased as we lower the production. At the present time we are using about 100 bushels in the two benches, and are making about 82,000 or 83,000 feet. It is a little singular that we made more in September, but our peculiar circumstances in that regard are well known.

The President—Have you figured out, on the Continental basis, the number of pounds of coke it takes to carbonize 100 pounds of coal?

Mr. Stedman—I never have; that would be a matter of very easy determination by anyone, provided the weight per bushel is known at the start. When we we were making 115,000 or 116,000 feet, our yield was about 5.05. The average for September was, as I remember it, 5.07. I had occasion to look over the September record several times, and particularly after the report of the October meeting; so that I think I am correct in stating that 5.07 feet per pound was the average yield for September. If we take 38 bushels of coke to the ton, to make about 11,000 feet of gas, and use 120 bushels to produce 115,000 feet of gas, the elements of the problem are all given to you.

The President—What was the yield per pound?

Mr. Stedman—5.07.

Mr. Cabot—Did you use any cannel coal at that time?

Mr. Stedman—No, sir.

Mr. Cabot—Do you speak of the long ton?

Mr. Stedman—Yes, sir.

Mr. Allyn—Did you notice any destruction or burning away of the benches?

Mr. Stedman—No, sir; we find that the arches are in very good shape; still, right at the point of the arch, and immediately over the furnace, it shows very strongly on the bricks.

Mr. Allyn—If you had considerable more heat there it might burn the arch away.

Mr. Stedman—There is no apparent cutting away of the arch.

Mr. Harbison—How much deposit did you find at the back of the bridge wall?

Mr. Stedman—That is a matter that we provided for in the setting, by making a pit considerably below the point of out-take in the side flue, so that if any matter is precipitated in that flue it is generally lodged in the back pit. We have never had occasion, since using that setting, to clean out any of the flues. The draught has always been as good at the last end of the use of the retort as at the first.

Mr. Allyn—You have not found any hard substance at the inlet of that bottom flue?

Mr. Stedman—Nothing that would obstruct the draught.

Mr. Harbison—Do you find that the back end of the retort, back of the bridge wall, heats as well as the front part?

Mr. Steadman—The back end heats very uniformly indeed. The front ends are heated out to the front wall; and the heat is very intense there. At first, when we built only an 8 or 9 inch wall, we found that it showed the effects of the heat within thirty days from the time of firing. After that we let the heat down and rebuilt the wall 13 inches thick, and left an air space around the bolt holes.

The President—Your percentage would be about 30¼ per cent. of coke?

Mr. Stedman—By the Continental standard of reckoning?

The President—No; in our way of figuring. That is very low in an ordinary furnace.

Mr. Harbison—Col. Stedman stated that his furnace was 14 inches. Is that at the top?

Mr. Stedman—It is of uniform width—the same at the grate bars as at the top. Is not the slag which sometimes collects in the flues, and which you have spoken of, partially the result of incomplete combustion? Is it not caused by carrying over the combustible matter into the draught and depositing it afterward in the flues, where they are welded together, and stopping there because of the diminishing heat? It does not seem to be carbon, but small particles of glassy matter, or of iron, which forms a slag. If that is the case it would not be so much the work of incomplete combustion as it is of the draught carrying little particles over.

Mr. Harbison—Do you have a high chimney?

Mr. Stedman—We have a chimney 80 feet high, and when using very high heats we connect with the chimney. At ordinary times we burn out through the chimneys at the top of the bench.

Major Dresser—What is the cross-section of that flue?

Mr. Stedman—I was never inside to see. The chimney is 10 feet square at the base on the outside. It is large enough to produce a very strong draught.

Mr. Cabot—Do you think you could maintain the same results without a tall chimney?

Mr. Stedman—I think that perhaps the best results were obtained when using the very strong draught.

The President—Your figures give 20.87 pounds of coke to carbonize 100 pounds of coal. That is the best result of which I have ever heard from an ordinary furnace.

Mr. Stedman—We find that it is not necessary to keep the whole width of draught open when we are burning through the stacks on top. The general idea is that that kind of setting requires very much stronger draughts than the ordinary setting; but my experience is to the contrary. I do not think it does. The flue spaces are pretty large, so that the rapidity of the passage of air, to burn the gases through them, is not so very much increased.

Major Dresser—Have you ever tested what the force of the draught is?

Mr. Stedman—I have never done so, but I think that the height of the chimney would give ¾-inch vacuum.

Mr. Wood—I would like to ask our friend Starr if he did not say yesterday that he used a blower on some of his benches.

Mr. Starr—I did.

Mr. Wood—And that the draughts were nearly closed?

Mr. Starr—That is correct.

Mr. Wood—I was a good deal struck with that. I believe that that is a very good idea—to get a draft without a draft, so to speak. I should think that much economy would result from that plan. Is there a blower attached to every bench?

Mr. Starr—I have only tried one bench in that way. I expect to adopt the same plan with all.

Mr. Wood—Can you make one blower answer for several benches.

Mr. Starr—I think so.

Mr. Wood—Can you tell about what is the power required to drive the blower?

Mr. Starr—For one bench I think four or five horse power is sufficient.

The President—I think that Mr. Cushing has had some experience with the Dieterich furnace; and we shall be glad to hear from him.

Mr. Cushing—My experience is only in connection with my other benches. I have as yet not been able to get results from the Dieterich furnace alone. Next Summer I shall probably run them alone, and shall be able to get more definite results from them. All that I can now say is that I have four which I have been running for several months this winter; and my result, so far as I can tell about it now, is a larger carbonization of coal in the retorts, with less fuel. We use the hot coke directly from the two lower retorts to fire with.

The President—Are the retorts which you have with the Dieterich furnaces the same size as the old ones?

Mr. Cushing—Yes, sir.

The President—What is the comparison between the amount of coal charged with the old and with the new furnaces?

Mr. Cushing—I should say about ten per cent. more in the new.

Mr. Cabot—How many hour charges?

Mr. Cushing—We are running four-hour charges.

Mr. Allyn—What proportion of coke do you use?

Mr. Cushing—We are using about 25 per cent. less of coke than we use in the old furnaces.

Mr. Cabot—How much did you use before that?

Mr. Cushing—I do not now recollect.

Mr. Cabot—Do you think that you were using 50 per cent. before?

Mr. Cushing—We were using a little less than 50 per cent. before; and we are saving about one-quarter of that.

The President—Mr. Nettleton has had some further use of the Dieterich furnace since last October; and he may be able to give us some ideas.

Mr. Nettleton—Those of you who were here a year ago will remember that I read a paper recording my failure in the use of the Dieterich furnaces. Since then I think that I have improved in my knowledge of how to work them. At all events, the working has been very much more satisfactory this winter than it had been before. I have not aimed at as high results, and consequently the economy has not been as great. The furnaces and the retorts last very much longer. The stack that I have is an exceedingly poor one. The radiation on all sides is very great; consequently I was only able to produce poor results with the ordinary furnace. With the ordinary furnace we produced about 6000 feet to the retort, with about 60 per cent. of the coke produced. I am able to increase the quantity of gas by nearly one-half. This winter I have been running generally at 8500 per mouthpiece per day, and can easily run it up to 9000, and have gone beyond that. I use to produce that result 40 per cent. of the coke made; so that, roughly speaking, I make one-half more gas than I was able to make before, with one-third less fuel, in spite of the fact that I have not met with as good success as I had hoped for. I am just now making preparations to put in two more Dieterich furnaces. The economy is too great for me to disregard it. In this connection I may state the results of some figures made a few years ago. I am giving the results of two ordinary benches and one Dieterich furnace. I cannot make the gas required with one Dieterich furnace and one ordinary bench. but I can with two Dieterich furnaces. I think that the difference would be considerable. As I figure it would be not less than $42 per week, if we were running two Dieterich furnaces, instead of one Dieterich furnace and two ordinary furnaces. The difference would not be so great except that my consumption is just at that point where I can produce it with the two Dieterich furnaces.

Mr. Harbison—What is the difference in cost between the Dieterich furnace and the ordinary furnaces?

Mr. Nettleton—The Dieterich furnace costs $450, including excavation, brick and iron work. The setting that you put in over that costs a little less than the ordinary furnace setting.

Mr. Allyn—Do you use three hour charges?

Mr. Nettleton—Four hour charges.

Mr. Stiness—Does the cost of $450 include the royalty?

Mr. Nettleton—No; I believe that the royalty is $200 per bench—but that sum pays for it for all time.

Mr. Stiness—If I get your idea clearly it is this; that, so far as you have experimented with the Dieterich furnace, it is satisfactory in its economical working, and that you will continue to put them in and discard the common means of firing your benches?

Mr. Nettleton—Yes, sir; that is my intention. It is, to a certain extent, satisfactory in its workings. It is more economical in its working than the ordinary furnace; but it does not begin to be as economical in its workings as the furnaces which we read about, and which they are using abroad. While I have effected an economy, I have not effected as great an economy as I had hoped for.

Mr. Stiness—You intend to continue the use of this furnace until the furnace of the future is developed?

Mr. Nettleton—Yes, sir. When I shall have completed the furnace I shall have all of the benches that I have in my house ready to use the Dieterich furnace.

The President—I think that, some years ago, Mr. Wood, of New Bedford, introduced a new furnace of which I have heard the claim made that it would use only 12½ per cent. of the coke to carbonize the coal. I would like to inquire of Mr. Wood what results he got from this furnace, and whether he still continues to use it?

Mr. Wood—We are using those same furnaces. I have heard of their being used in that way, with 12½ per cent. of the coke made; but I never could use them so. We use from 33 to 40 per cent. of the coke made. When we use 40 per cent. we can get about 5.10 or 5.15 to the pound of coal.

Mr. Stiness—Without any enricher?

Mr. Wood—Yes, sir; with or without, if we have good coal.

Mr. Harbison—Of what candle power?

Mr. Wood—From 17 to 18. I think that the Inspector gave us 17.8 as our average. We found that our average ran a little higher—about 18.

The President—What is the production of the benches in twenty-four hours?

Mr. Wood—The production of gas is rather small. The benches and retorts are small. We put them right upon the bases of our old three retort arches, and they are only 6′ 8″ wide, which are too narrow to get in large retorts. The retorts are rather small, and if we charge them very heavily we do not get heat enough, because we have cut off our tall chimney, and use only a short chimney. I think that if we had more draught we could get better results from the charges, and could use less coke per thousand. I think that we made a mistake in putting in only three chimneys for seven benches. If we had put in a chimney for each bench I think we would have done better. If we do not make any different arrangement I think we shall yet do that.

Mr. Stiness—Do I understand Mr. Wood to say that his arches are 6′ 8″?

Mr. Wood—They are 6′ 8″.

Mr. Stiness—With a bench of fives?

Mr. Wood—A bench of sixes.

The President—I see that Mr. Lamson is here. He has had a large experience with the Dieterich and with other furnaces, and we would like to hear from him.

Mr. Lamson—This is a very busy time with me, and I have been only just able to get here. I am sorry I was not able to hear this discussion. I have not had time to prepare any paper on the Dieterich furnace. In fact every moment of my time has been occupied in lighting the city. You have probably seen in the papers the statement that they are going to light Boston with electricity. They have been going to do it for the last six months; and during that time we have been exceedingly pressed in driving our machinery just as hard as we could, using all our machines, and in fact running them beyond their capacity. I have, therefore, not been able to spare the time to get up any paper.

As regards our experience with the patent furnaces, I can only say that we are still experimenting. We have made many changes. We have been running the Dieterich furnaces under varying circumstances, and have been getting various results. We are now proposing to alter them entirely over once more. We think that we have, in the experiments of the past year, learned a great deal; but still believe that we know very little about the system. But we know more than we did at the beginning of the year. We are going to start anew with some facts which we have learned, and which we think will improve the furnaces very much indeed. During the past year we have succeeded in making the furnaces do their work better and last longer. The furnaces now give us no trouble in the matter of wearing out. We have deepened the furnaces, and have made other changes in them which have very much improved them. Just at the present time our principal trouble is with the settings and retorts. We are very anxious, if we use these furnaces, to charge the retorts with a large amount of coal. The heavy charging, and the high heats necessary to work off heavy charges, use up the retorts in a very short time; and we are now trying to find out the various forms of retorts which are made with special reference to high heats, and have also been lately experimenting with very much heavier settings. We have some ideas which we hope, when put into practical operation, will make the furnaces more effective in their workings. I may say that we can get all of the heat we want to work off the charge very nicely; and we have no trouble from stoppages. The principal trouble in the past few months has been that the heat is so intense as to injure the settings. The settings are not heavy enough.

We are now experimenting, in another stack of retorts, with the Oechelhauser furnace; but we have only had it fired for a little while. At this time we are getting a very even heat with it. It would please any man who has anything to do with the firing of furnaces to see the heat that comes from that furnace, and to see how beautiful and even it is throughout the whole setting. But at present we have not got that heat up beyond a cer

tain point. We are now making some alterations in order to get the retorts hot enough. We can get them hot enough to charge, but they are not hot enough to work off large, or even regular charges. But the heat that we do get in the furnace pleases us very much, from the fact that it is so even.

Major Dresser—What is the height of the chimney you have in connection with that furnace?

Mr. Lamson—I should say it was over fifty feet from the bottom of the furnace.

The President—From your experience so far, if you were obliged to construct a stack of new benches, would you feel justified in constructing the old style of furnace?

Mr. Lamson—There are a great many things to be considered before coming to a determination as to that. If I were going to start a large works I should arrange my stacks for the generator furnace. I believe that is what is coming. If I were to build a new stack for a small works, I should say, "Let this thing alone until the larger companies get the thing worked out." It may seem strange to some gentlemen here that we do not come forward with papers on this subject, and tell everything that we know. The fact is that we do *not* know; and I am not going to come forward with any definite statements with regard to the working of these things until I feel satisfied that I have something. I do not like to talk of an experiment while I am still in the midst of it. As you know, we have been trying these things for over a year, and we are getting all sorts of results. I think we are improving all the time. We are doing just what they did on the other side; we are learning by experience; and I think we are going to get something out of it. Just at the present time we have not got the thing so developed that we are able to put it into any large stack. If you are going to build new works of considerable size, I should advise you to so build your arches and foundations that you may adapt them to any new form of furnace that may be brought forward. We this summer built a stack of 72 retorts and 12 benches. We carried the foundation for those benches 8 feet below the floor level, building of fire brick, and building all the walls down just the same as if they were built above the floor. We leveled everything in solid, and then built the ordinary settings. We did that in order that we may at any future time put in their place any kind of furnace we may desire to use. People who are connected with small works are constantly coming and asking with regard to this, that, and the other thing which they have seen mentioned in the American Gas Light Journal, or have heard spoken of; and I always advise them to take some form which is known to work well, and which is known to give good results; and let the larger companies do the experimenting. When the larger companies have developed something which is really good, they will be very glad to say so; and then the smaller companies can adopt it. I think that is the wisest and the safest plan.

The President—It has been suggested that Mr. Sherman is using the bridge-wall setting, and we would be glad to hear now the results of his experience.

Mr. Sherman—I have not been using it long enough to have much to say about it. I have only used it for eight months. So far as we have used it, we have found it a very excellent setting. We are getting better results from the benches set in that way than from any others that we have in the house. As at present informed with regard to settings, I should use that setting in the future.

Mr. Harbison—With the old style of furnace?

Mr. Sherman—Yes, sir.

The President—What percentage of coke do you use?

Mr. Sherman—We use 46 per cent. in all our settings. We have various settings, and, taking it on the year's business, we use 46 per cent. of our coke.

The President—Have you been able to determine the difference between this and the old style of setting in the amount of fuel used?

Mr. Sherman—We have not worked those retorts separately; we know that we get better heats with them, with a less consumption of fuel, than we do from any other setting that we have. We consider them by far the best setting that we have. There is a short chimney to each bench.

Mr. Greenough—Do you have any difficulty in getting a draught?

Mr. Sherman—We have no difficulty. We do not have our damper open. We have no difficulty with the draught.

[To be continued.]

Non-Conductivity of Different Materials.

Mr. Charles E. Emery, of New York, recently made some experiments upon relative non-conductivity, with reference to the needs of the New York Steam Company. His apparatus consisted of a boiler 12 feet long and 4 feet in diameter, with three 10-inch flues passing through it. Inside these flues were smaller tubes, through which the steam passed, The non-conductors surrounded the inner tubes, and water was kept circulating around the flues in the outer shell.

A layer of hair felt 2 inches thick gave the best result, and, using equal thicknesses of the other materials, the following results were obtained:

Hair felt	100.0
Mineral wool, No. 2	83.2
Mineral wool, No. 2, and tar	71.5
Sawdust	68.0
Mineral wool, No. 1	67.6
Charcoal	63.2
Pine wood, across grain	55.3
Loam	55.0
Gas works lime, slaked	48.0
Asbestos	36.3
Coal ashes	34.5
Fuel coke	27.7
Air space, 2 inches deep	13.6

The low result from air space no doubt is due to the unimpeded circulation of the currents.—*Iron Age.*

[From the London "Journal of Gas Lighting."]

The Gaslight and Coke Company.

The Ordinary Half-Yearly General Meeting of this Company was held on February 17, at the Chief Office, Horseferry Road, Westminster—the Hon. R. Howe Browne (the Governor) in the chair.

During the discussion of the report Mr. Livesey said—

I should like to add one word, Sir, to what you have said about leakage. It must be remembered that consumers' meters are passed and stamped as correct when they register three per cent against the companies; but two per cent. only is allowed against the consumers. I believe in a great number of cases the consumers may get two per cent. more than they are actually charged. This would take off a portion of the leakage; and I repeat that, so far from this leakage being considered excessive, it will probably be increased. You made a remark about consumers exercising forbearance during the fogs; but I believe it will be the policy of all gas companies to increase the day pressure, to facilitate the use of gas for cooking and heating and for other day purposes. If the pressure is increased, we must be prepared for an increased loss of gas; but this I hold would be money well laid out. After your statement, I need not refer to the bad debts, beyond saying that is a very moderate amount. One-half per cent. on the rental is about the lowest it can be expected to reach, and this, with only about £1,000 beyond, is how you stand. I now approach another subject with some amount of diffidence, and I hope that no remarks I make will be taken as being hostile or antagonistic to the company or the Directors. With this diffidence, therefore, I wish to say a few words as to capital. A complete revolution has taken place in the circumstances of gas companies as to capital. Before 1875 or 1876, when the sliding scale and auction clauses were introduced, it was the direct interests of the shareholders to have as much capital invested as possible. A meeting scarcely ever took place without shareholders pressing on directors to make more calls, and the shares were issued at par, the premium going into the pockets of the shareholders. I believe, therefore, that gas companies were lavish in their expenditure, and I know that directors exercised great self-denial in checking the desire of shareholders for further calls. Still, capital was spent more than it ought to have been. When, however, the sliding scale and the auction clauses were introduced, things were totally reversed, and now it is the direct interest of everyone in gas companies to spend as little as possible, as every pound of capital issued tends to decrease to some extent the dividend on the old capital. I have taken out the expenditure of capital by the Chartered Company for a period of six years—from Dec. 31, 1875, to Dec. 31, 1881—and I find that the total amount of capital expended by the Company in this period has been £1,804,923. This is money actually expended on extension of the works. The increase in the quantity of coal carbonized in these six years has been 271,259 tons. I should allow from this amount of capital £300,000 for the erection of tar and ammonia works and the purchase of land, and this will bring it, in round figures, to £1,500,000 as the increase of capital to meet the increase of business of 271,000 tons of coal. That is £5 11s. per ton of coal. In the old days £6 or £7 per ton of coal were not considered unreasonable; and your £5 11s., judged by the old standard, would be considered very fair and moderate. But we have found, under the influence of the new principles, that £5 is more than is required, and that so far from this sum being necessary, there is a Company in London—not the one I am connected with, for I do not wish to institute any comparisons of that nature—which has made its extensions at £3 8s. per ton of coal. Under these circumstances, it appears to me—and I put it forward with all deference—that for your extensions something like £2 per ton of coal has

been expended on works more than should have been expended. On the other hand, no doubt you will say, and with truth, that your works have been constructed substantially. In fact, I may say this—that no works in existence are constructed in a better manner, or more substantially, than those of The Gaslight and Coke Company. Still, it is possible to be too substantial. I do not wish to go into the question of how the capital has been expended, or to find fault with it; but I would throw out this suggestion or hint, that you should economize in certain particulars. I would instance the case of gasholders. In old days it was commonly supposed that gasholders would cost about £20—in fact, they have cost £30—per 1000 cubic feet of capacity; but as they have increased in size they have gone to lower rates—to £20, £18, and £17, which was considered very moderate. We now find, however, that they can be constructed at less than £9 or £10 per 1000 cubic feet of capacity. If so, you may now have for £50,000 a gasholder with as much capacity as hitherto would have cost £100,000. In this respect I would point out one of the features of the old plan. The crown of a gasholder used to be supported by an immensely strong iron frame, and this frame had absolutely nothing to do. The proof that it had nothing to do is that gasholders are now constructed throughout the kingdom with no roof framing at all. Therefore I consider the attention of the board might be brought to this subject, that you may save much in the construction of gasholders and other works. You mentioned that your cost of coal had been 15s. per ton. I cannot understand how the 15s. is made up. I know something about the purchase of coal, though my experience is not so large as that of the gentlemen on the other side of the table; but I consider it right to say that coal might be purchased for 1s. 9d. per ton less—the money that is expended for making common gas last year might have been 1s. 9d. per ton less, and this would represent £50,000 or £55,000 in the half year. There is another way in which I think money might be saved on coal. This I know is a debatable point, but I speak from my own convictions—I refer to the use of cannel. Of course the more gas you get out of coal the better, but it must be gas that is good for something. I believe the last 300 or 400 feet of gas obtained from your common coal is worthless, and that you are obliged to make up the deficiency in quality by using a considerable quantity of cannel. In this way you pay 1s. to get 6d.; and, in my opinion, if you were contented with 10,000 instead of 10,300 cubic feet of gas per ton, you would save half the cannel you use; three per cent. would be sufficient instead of six per cent., and every one per cent. of cannel used adds 2½d per ton to the general price of coal. I do not wish to say anything about the residuals, because I know you have done your best, and have great difficulties to encounter; but it is my conviction that we ought to buy our coal, or anything else we require, and sell our products as nearly as possible at the market price of the day. I object to long contracts and to holding stocks. Sell at the price of the day, and then I think we shall be relieved from all blame for going in for speculative rates. I hope that, in the remarks that I have made, I have not been considered to have been actuated by any hostile spirit. I am considerably interested in gas companies, and the interests of all gas companies are to a certain extent bound up in the welfare of the Chartered Company; and nothing would please me better than to see the Chartered running, not perhaps ahead, but at any rate abreast of the best as to price and all other matters. It would be a very great advantage if we could reduce the price of gas; and this is our best and strongest safeguard against all competition whatever.

A Proprietor remarked that he gathered from the Governor's speech that some interesting statement was to be made about the electric light in connection with the Savoy Theater. There was, he said, no blinking the fact that gas shareholders were more or less alarmed at the electric light. For his own part he quite agreed with Sir Mordaunt Wells, and had not the least fear. In fact, he believed there was room for both gas and the electric light; and he should regret the Directors spending a large sum of money in opposing the application for powers by the electric lighting companies. They were, he said, sure to get them. The Directors, of course, were perfectly right in watching them, to prevent their having inserted clauses in their Bills which would injure gas companies.

The Governor—I will answer the few observations made by my friend Mr. Livesey, whom I cannot help congratulating upon the honorable position which he has now attained as a Director of one of the largest gas companies in London. I am sure there is no man in London more competent to fulfill the duties of a Director than Mr. Livesey, and nothing proves this more than what he has done in the past. I will now refer to one or two points upon which he has thought fit to remark. The first is as to capital. I do not think it is quite fair to take the capital of this great Company and compare it with other companies much more modern; for Mr. Livesey knows perfectly well that in our Company there is an enormous amount of dead capital that is not contributing to the dividend earned, but on which we pay 11 per cent. You must also consider that at Beckton we have considerable reserves for the future. We have two very large retort houses, which have cost us £80,000 to £90,000 each. These will come into operation by-and-by and will be required for the extension of gas consumption. At Bromley, though we have just ordered two gasholders, we have had the tanks ready there to receive them; but they have not yet contributed anything to the gas-rental. As to the products I fully agree with Mr. Livesey that the true policy of a gas company is to take advantage of the market price of things when opportunity offers, and I can assure him that this is our policy to the very letter. We never miss an opportunity of disposing of our residuals, and we in no case hold them back with the idea of getting a larger amount for them. As for the remark of the honorable proprietor who last addressed us, about the Savoy Theater, I must confess that in the hurry of the moment it escaped me to make the statement that I had intended. The Savoy Theater was erected on the site of some houses in what is called the Savoy, near the Strand. For a long time we had been lighting these houses at a moderate rental. Since the Savoy Theater has come into existence there has been an enormous quantity of electricity used there for lighting the theater. No one quite knows the cost of this electricity, and to back up the electricity this Company has received a rental of £384 since last September for the light of gas to carry on the work of the theater. This does not tell very much for the applicability of the electric light in houses. They were obliged to light the back and the smaller parts of the theater by gas, as they cannot, according to their present knowledge, apply electricity in those parts of the building. I am also informed—and I believe it is perfectly true—that on several occasions in the proscenium the electric light has gone out, and gas has been called into requisition to supply its place. That is not very encouraging, I should say, to the honorable proprietor who says the Electric Lighting Companies will obtain their Acts.

Steamy and Frosted Windows.

The *Ironmonger* discusses as follows a subject of interest to all retail dealers:

What is the cause of steamy windows? The hackneyed answer that the cold outside condenses the moisture of the air is undoubtedly correct, but it does not explain how the moisture gets into the air. And as the air in the shop is warmer than that outside, its power of retaining water in a vaporous condition is very much increased, so that the watery vapor in the air of the shop must greatly exceed that of the external air, or no deposit of moisture would take place. It is certain that the greatest deposit of moisture takes place in warm, well-closed shops, and the idea that the warmth has something to do with the deposit is a very natural one. A walk along the street in a winter evening shows that the amount of moisture on the windows varies very much in different shops. Some will be almost free from it, others are as opaque as if they were of ground glass. For some time we have been trying to find the reason for this, and although we cannot explain all the anomalies we meet with, yet we think some light can be thrown on the matter.

The best lighted and warmest shops seem to suffer most. Now, as warmth ought to decrease the deposit, provided the air could take up no more water as it got warmer, we must look for some means by which the proportion of watery vapor in the air is increased with the temperature. This is at once found in the gas, which is almost universally used for lighting and very often for warming. For the amount of light given out gas produces very much more water than either oil or candles. If the ventilation be thorough enough to keep the air of the shop nearly at the same temperature and humidity as that outside, no moisture will be deposited on the window, but if the air is at all confined, as the assistants will certainly wish it to be, then as long as gas is burned and the products of combustion allowed to escape into the air, so long will the windows be obscured by moisture. As gas is the great offender, it is useless to provide air-tight windows, at enormous cost, if they be lighted with gas inside. We know of a shop where some hundreds of pounds were spent in air-tight cases for the windows, where this mistake was made. Another source of moisture is the breath of the assistants and customers, and this seems to be sufficient to make it impossible to avoid all deposit on the windows. But if petroleum or electricity be used to light the shop, or if the products of the combustion of the gas be carefully removed, then the nuisance will be greatly mitigated. Some shops are lighted by "sun" burners on the ceiling. The effect, as regards illumination, is excellent, and this plan makes it very easy to remove the products of combustion. Of course, if a gas stove be used to warm the place, and the products of combustion allowed to escape into the shop, neither petroleum nor electricity will prevent steamy windows. Various contrivances—such as open gratings at the top of the windows, double sashes, etc.—have been tried, but the measure of success achieved appears to have been irregular and often disappointing.

AQUARIUM CEMENT.—Red lead, 3 parts; litharge, 1 part. Make into a paste or putty with raw linseed oil.

Purification of Naphthaline.

By Prof. G. Lunge.

It is well known that the whitest naphthaline turns red by a longer or shorter exposure to the air, and this indicates impurities. The naphthol manufacturers, however, demand a naphthaline which is as pure as possible chemically, and which remains white. The author published in the *Berichte*, of Berlin, a simple method of purification based upon the assumption that reddening of naphthaline was analogous to that of phenol (carbolic acid). The very purest phenol does not turn red, and it is only in the presence of traces of the higher homologues that the redness appears in a longer or shorter time. Therefore the use of an oxidizing agent seemed to be indicated for use in purifying naphthaline, and it led to the desired end in a simple manner.

The crude naphthaline is mostly obtained from the oil that remains after treatment with soda lye for the purpose of separating the phenol. In such oils the treatment with acid can be begun at once, but naphthaline which has been obtained directly from the tar oil by crystallizing out, should first be treated with alkalies.

The crude naphthaline is melted and a certain quantity of sulphuric acid added to it. On a large scale 5 or 10 per cent. of acid, of 66° B., is sufficient; but if acid of 60° is used of course proportionately more is required. When the liquid naphthaline and acid have been well mixed and stirred, 5 per cent of finely ground pyrolusite (binoxide of manganese), or, better still, the regenerated oxide of manganese (from the Weldon process) is gradually added and the mixture heated fifteen or twenty minutes in a water bath. It is then allowed to cool and the cake of naphthaline is washed several times with water, then a little soda is added to the wash water, and then it is again washed in clean water. The naphthaline thus prepared is finally distilled. When purified in this way it has kept perfectly white, according to Lunge, for eight or nine months.

In this country, where the water gas process is so extensively employed, a comparatively pure naphthaline is obtained as a waste product, and if treated as directed by Prof. Lunge would, no doubt, be an excellent material for making naphthol and other derivatives.—*Sci. Am.*

Action of Hydraulic Cements upon Embedded Metals.

John C. Trautwine, C.E., in a communication to the *Railroad Gazette*, dated Philadelphia, Jan. 21, 1862, says:

"The fact that this important subject has of late been brought somewhat prominently before the notice of civil engineers and builders induces me to send you the results of ten years' trial by myself. The hydraulic cements used were English, Portland, and Louisville (Kentucky), besides which I tried plaster of Paris, both pure and mixed, with equal measures of the cements. All were of about the consistency of common mortar; and all were kept in an upper room during the ten years, unexposed to moisture other than that of the indoor atmosphere.

The metals were partly embedded in the pastes and partly projecting from them. They consisted of cut iron nails (some of which were galvanized), smooth iron wire nails, brass both in sheet and wire, zinc in sheet, copper wire, and solid cylinders of lead, three-eighths inch in diameter.

"The result at the end of ten years was that all the metals in both of the *neat* cements were *absolutely unchanged;* and the same was the case with those in the Plaster of Paris, with the exception of the *ungalvanized* nails, which had become covered with a thin coat of rust; as were also those in the mixtures of plaster and cement, but to a less degree.

"This experience leads to the inference (already suggested by others) that dampness or moisture is the injurious agent in those cases of corrosion of iron and lead laid in cement that have lately appeared in the journals; and that if dampness can be absolutely excluded, both cement and lime mortar will probably protect from injury all the metals employed in ordinary constructions for an indefinite time.

"Such entire exclusion of dampness may at times be somewhat difficult of attainment; for capillary attraction alone, unaided by hydrostatic pressure, will cause water to rise several inches in well-hardened cement; and it would be difficult to assign limits to its penetration when aided by a high head of water. Rain water is well known to percolate through many feet in depth of brickwork or masonry laid in lime mortar, even when it consists partly of cement."—*Sci. Am.*

Street Lighting in Cincinnati.

The Cincinnati *Commercial*, of Friday, Feb. 24th, contains the following:

The Committee on Light met yesterday afternoon, with present Messrs. Dirr (chair), Geiger, Campbell, of Board of Aldermen, and Stowe, Stevens, Cox, Russell and Bauer, of Councilmen.

They approved and recommended to Council for passage a resolution to contract with Thos. McDonough to light the streets with gasoline for five years at the following rates:

All night table at $23 75 per post per year.

Moonlight time table at $21 per post per year.

Setting post, each, $2 25.

The sureties are George Wilshire and Wm. Woods.

The specifications require the use of "the best gasoline burner now known, the style of burner to be to the satisfaction of the Common Council and the Board of Public Works."

The "now known" means the best in use when the contract is effected. What may be developed hereafter is not specified.

The resolution to light with electricity the public landing, the ferries, the parks and other public places was postponed, but the committee understood that it will cost 98 cents per light per night, or about $360 per light per year for that purpose alone.

Deaths Caused by Gas.

Richard H. Stryker, a farmer of Jefferson City, Greene County, Iowa, went to bed at the Bridge Hotel, in Chatham street, on Monday, at 11 P.M. Yesterday morning there was a smell of gas in the hall, and the door of his room, which was locked, was forced. The room was full of gas, and he had been dead a number of hours. There is no reason to suspect suicide. There was $100 in his purse.

A well-dressed man of 30, registered as Frederick W. Hoffman, was found dead in his bed at the North River Hotel, in Barclay street, with the gas turned on.—N. Y. *Sun*, March 2.

Serious Gas Explosion.

About nine o'clock on the morning of February 27, a loud explosion occurred in the Union Building, Chicago, Ills., in which the the general offices of the Associated Press and Western Union Telegraph Company are located shaking the entire building and knocking out heavy plate-glass from windows in all parts of the building. Wood-work, doors and plastering were also demolished. The explosion was caused by a boy named James Brett, entering one of the vaults where gas had been escaping since Saturday, with a lighted match.

He was seriously, if not fatally injured.

Price of Coal at Pittsburgh.—Pittsburgh coal consumers are considerably agitated over the fact that Pittsburgh coal is selling in the ports of Cincinnati and Louisville at as low a price per bushel as is asked for it in Pittsburgh. The dealers say that the abundant floods of this winter have allowed the shipment of so much coal to other ports that the market is overstocked.

Correspondence

[The Journal is not responsible for the opinions expressed by correspondents.]

Correction.

To the Editor American Gas Light Journal:

In the published report of my paper on "Condensation and Hot Scrubbing," in your issue February 16th, there are several errors. In speaking of the zig-zag scrubber at New Haven Gas Works, I said the gas was brought in contact with 6,000 (six thousand) feet of iron plates coated with tar. You have it 600 (six hundred) feet.

In speaking of the zig-zag used by Mr. Stedman, Newport, R. I., I said he used 20 (twenty) feet heating surface in a coil at bottom of scrubber. You have it 2 (two) feet. I said it was claimed there was ⅓ (one-third) of a gallon of benzole in the tar produced from one ton of coal. You have it one-third of a barrel.

By putting this in your next issue you will oblige Yours,

New Haven, Feb. 17, 1882. F. C. Sherman.

Not Recommended.

To the Editor American Gas Light Journal:

The American Electric Light Company having asked permission to light the Representatives' Chamber in our State House, the Committee on Finance made the following report:

"The Committee on Finance, to which the question was referred, is is of the opinion that the American Electric Light Company *ought not to be permitted, even at the cost of gas now used for that purpose*, to illuminate the Representatives' Chamber." Lean.

Boston, March 9, 1882.

Gas Stocks.

Quotations by G. W. Close Jr., Broker and Dealer in Gas Stocks.

(with W B Scott & Co.,)

34 Pine Street, New York City.

March 16, 1882.

☞ All communciations will receive particular attention
☞ The following quotations are based on the par value of $100 per share. ☜

	Capital.	Par.	Bid.	Asked
Gas Co.'s of N. Y. City.				
Central	$466,000	50	70	75
Harlem	1,800,000	50	94	96
" Bonds	170,000			103
Manhattan	4,000,000	50	235	240
Metropolitan	2,500,000	100	165	168
" Bonds	658,000	..	107	110
Mutual	5,000,000	100	97	99
" Bonds, go'd.	900,000	1000	100	104
Municipal	1,500,000	100	198	202
" Bonds	750,000		106	110
New York	4,000,000	100	122	125
Northern	270,000	50	—	100
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	110	114
Citizens	1,200,000	20	60	65
" S. F. Bonds.	320,000	1000	105	109
Fulton Municipal	1,500,000	100	75	80
Peoples	1,000,000	10	25	30
" Bonds	290,000	.	101	104
" "	250,000	...	70	75
Metropolitan	1,000,000	100	60	65
Nassau	1,000,000	25	60	64
" Ctfs.	700,000	1000	95	100
Williamsburgh	1,000,000	50	60	65
" Bonds	1,000,000	...	98	103
Richmond Co., S. I.	300,000	50	70	75
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N.Y	750,000	100	75	80
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	80	85
" " Bds.	124,000	—	105	10
Chicago Gas Co., Ills			125	—
Cincinnati G. & C. Co.			178	180
Consolidated, Balt.			38	39
Bonds			107	—
East Boston, Mass	220,000	25	122	128
Hannibal, Mo	100,000	100	95	100
Hartford, Conn	700,000	25	140	144
Halifax N. S	400,000	40	148	150
Hamilton, Ontario	750,000	40	117½	
Jersey City	750,000	20	155	160
Jacksonville, Ill	120,000	50	100	...
Lewistown Maine	400,000	100	—	100
Laclede St Louis Mo.	1,200,000	100	108	110
Montreal, Canada	2,000,000	100	159	160
New Haven, Conn		25	132	—
Oakland, Cal			32	33
Peoples, Jersey City		...	75	80
" " Bds.				5
Pittsfield, Mass			120	130
Rochester, N. Y.		50	70	80
" Citizens		100	30	35
Wilmington, Del.		50	174	...
Yonkers		50	30	32
St. Louis Missouri	600,000	50	250	254
San Francisco Gas-Co., S. Fr'isco Cal.			68	69
Toledo, Ohio			95	97
Troy, Citizens	600,000	100	—	—
Washington, D. C.	1,500,000	20	185	200
" Scrip	375,000	15	200	206

Advertisers Index.

GAS ENGINEERS. Page

William Farmer, New York City ... 118
G. Warren Dresser New York City ... 140

GAS WORKS APPARATUS AND CONSTRUCTION.

Herring & Floyd, New York City ... 139
T. F. Rowland, Greenpoint, L. I ... 139
Delly & Fowler, Phila., Pa ... 139
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 139
Stacey Mfg. Co., Cincinnati, Ohio ... 139
Bartlett, Hayward & Co., Baltimore, Md ... 139
P. Munzinger, Phila., Pa ... 139
Morris, Tasker & Co., Limited, Phila., Pa ... 139

GAS AND WATER PIPES.

A. H. McNeal, Burlington, N. J ... 138
Gloucester Iron Works, Phila., Pa ... 138
R. A. Brick, New York City ... 138
James Marshall & Co., Pittsburgh, Pa ... 138
R. D. Wood & Co., Phila., Pa ... 138
Warren Foundry and Machine Co., Phillipsburgh, N. J ... 138
Mellert Foundry and Machine Co., Reading, Pa ... 138

WASHERS AND SCRUBBERS.

G. Shepard Page, New York City ... 110

RETORTS AND FIRE BRICK.

J. H. Gautier & Co., Jersey City, N. J ... 136
B. Kreischer & Sons, New York City ... 136
Adam Weber, New York City ... 136
Laclede Fire Brick Works, St. Louis, Mo ... 136
Brooklyn Retort and Fire Brick Works, Brooklyn, N. Y ... 136
Borgner & O'Brien, Phila., Pa ... 136
Gardner Brothers, Pittsburgh, Pa ... 136
Henry Maurer, New York City ... 136
Evens & Howard, St. Louis, Mo ... 136
Chicago Retort and Fire Brick Works, Chicago, Ills ... 136
Taylor and Anderson, Cincinnati, Ohio ... 134

DIETERICH'S REGENERATOR FURNACE.

Charles F. Dieterich, Baltimore, Md ... 142

GAS METERS.

Harris, Griffin & Co., Phila., Pa ... 142
American Meter Co., New York and Philadelphia ... 143
The Goodwin Gas Stove and Meter Co., Phila. Pa ... 143
Helme & McIlhenny, Phila., Pa ... 143

GAS STOVES.

American Meter Co., New York and Philadelphia ... 135

VALVES.

Ludlow Valve Manufacturing Co., Troy, N. Y ... 140
Chapman Valve Manufacturing Company, Boston, Mass ... 140

EXHAUSTERS.

P. H. & F. M. Roots, Connersville, Ind ... 137
Smith & Sayre Manufacturing Co., New York City ... 137

GAS COALS.

Penn Gas Coal Co., Phila., Pa ... 141
Perkins & Co., New York City ... 140
Cannelton Coal Co., New York and Philadelphia ... 141
New York and Cleveland Gas Coal Co., Pittsburgh, Pa ... 141
Newburgh Orrel Coal Co., Baltimore, Md ... 141
Despard Coal Co., Baltimore, Md ... 141
Fort Pitt Gas Coal, Pittsburgh, Pa ... 140
Chesapeake and Ohio R.R Coal Agency, N. Y. City ... 141

GAS ENGINES.

Schleicher, Schumm & Co., Phila., Pa ... 134

STEAM STOKERS.

A. Q. Ross, Cincinnati, Ohio ... 114

PURIFIER SCREENS.

George D. Cabot, Lawrence, Mass ... 133

BURNERS.

G. Gefrorer, Phila., Pa ... 140
The Goodwin Gas Stove and Meter Co., Philadelphia, Pa ... 120

PURIFYING MATERIAL.

Connelly & Co., New York City ... 137

STEAM BLOWER FOR BURNING BREESE.

H. E. Parson, New York City ... 134

PROCESSES.

Gwynne Harris New York City ... 138
Strong Gas and Fuel Co., Yonkers, N. Y ... 134
National Gas Company, Phila., Pa ... 133

GAS FIXTURES.

Mitchell, Vance & Co., New York City ... 137

CEMENT.

F. O. Norton, New York City ... 137

BOOKS.

Economy of Gas as a Fuel ... 141
Gas Analyst's Manual ... 136
Scientific Books ... 139
Cathels' Gas Consumers' Manual ... 143
Fodell's Book-Keeping ... 143
Review of Gas and Water Engineering ... 143

WANTED, TO PURCHASE,
Several Gas Works Anywhere in the United States,

WITH A VIEW TO IMPROVING AND EXTENDING THE SAME.

Companies not paying dividends, or who are about to rebuild or enlarge their works, and do not wish to make assessments for improving, will find it to their interest to communicate with us before expending money for repairs or improvements.

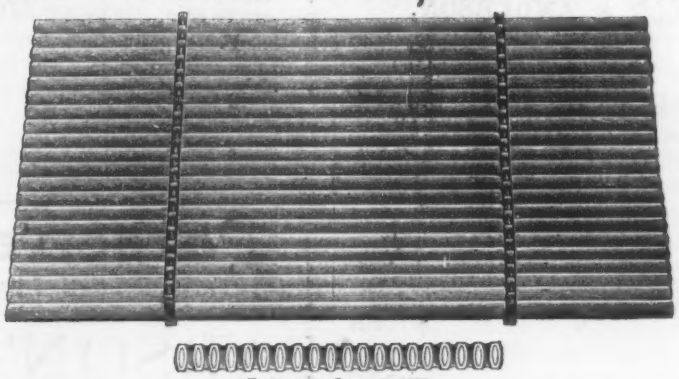
Call or address, with some particulars, such as average consumption of gas, the selling price to consumers, holder capacity, size and length of street mains, etc.,

THE NATIONAL GAS COMPANY,

Builders of Lowe's Improved Gas Works,

No. 430 Walnut Street, Philadelphia, Pa.

Church's Reversible Screen, for Gas Purifiers.



Patented July 9, 1878.

Reversible, Very Durable, & Easily Repaired. Oval Slats, with Malleable Iron Cross Bars.

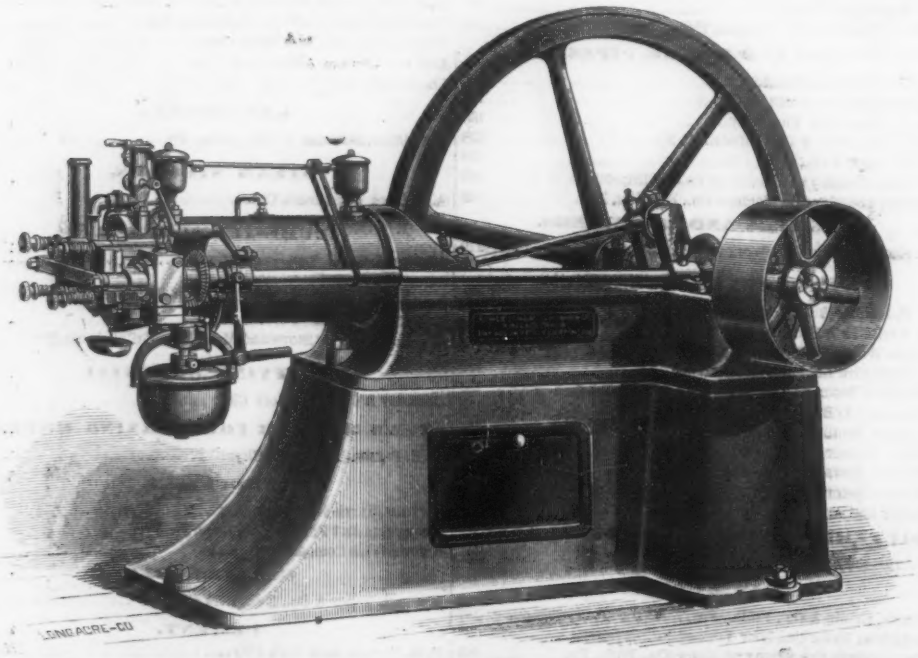
Apply to Continental Works, Greenpoint, N. Y., or Davis & Farnum Manufacturing Co., Waltham, Mass., who are authorized to build them, or to

GEORGE D. CABOT, Agent Lawrence Gas Co., Lawrence, Mass.

References:—Lawrence Gas Co., Lawrence Mass., Roxbury Gas Co., Roxbury, Mass.; Newport Gas Co., Newport, R. I.

SILENT GAS ENGINE.

Always Ready to be Started, and to give at once Full Power.



NO STEAM TO MAKE OR MAINTAIN.

NO COAL NO ASHES NO DIRT.

NO FIRE NO DANGER NO EXTRA NSURANCE

NO GAUGES, NO PUMPS NO LEAKAGES.

ALMOST NO ATTENDANCE.

BURNS COMMON GAS.

AVERAGE CONSUMPTION PER HORSE POWER

21 1-2 Cubic Ft. Per Hour.

COSTS NOTHING WHILE STANDING LITTL WHILE RUNNING WITHOUT DOING WORK AND WHILE WORKING THE GAS IS PRECISELY REGULATED BY THE GOVERNOR IN PROPORTION TO THE POWER DEVELOPED

SIZES AT PRESENT OFFERED, **2, 4 and 7 H. P**

LARGER SIZES TO ORDER.

THE NEW OTTO SILENT GAS ENGINE.

Unexcelled for Convenience and Economy in running Gas Exhausters, Tar and Ammonia Pumps, Hoists in Warehouses or Stores, Ventilating Theatres, Halls and Buildings, Driving Electro-Magnetic Machines,

And useful generally for all work of small stationary steam engines. Where work is intermittent, trouble with a steam boiler and engine is at its maximum, but is at its minimum with a gas engine. For particulars, prices, etc, apply to

SCHLEICHER, SCHUMM & CO.,
3045 Chestnut Street, Philadelphia.

WANTED,

To Lease or Purchase,

A GAS WORKS,

In a Town using from 3,000,000 to 15,000,000 per annum.

Address **A. D. CRESSLER,**
Manager Kerr Murray Mfg. Co.,
546-51 FORT WAYNE, IND.

CHAS. TAYLOR, Manufacturer. J. ANDERSON, Manager.

CINCINNATI
Gas Retort & Fire Brick Co.

TAYLOR & ANDERSON,
(Late CHAS. TAYLOR, estab. 1872.)

CONTRACTORS, AND MANUFACTURERS OF

GAS RETORTS, FIRE BRICK, AND TILE.

BLAST FURNACE LININGS; CUPOLA BLOCKS;
GRATE SETTINGS; STOVE LININGS;
FELL'S, DANK'S AND FRANK'S SMOKE PREVENTOR TILES;
DANK'S ROTARY PUDDLING FURNACE TILES;
SIEMENS' & OTHER GAS REGENERATIVE FURNACE TILES;
XXX PRESSED GAS WORKS FURNACE BLOCKS;
FIRE CEMENT, ETC., ETC.

POROUS NON-CONDUCTING BRICKS FOR BENCH FRONTS.

Plans furnished, and competent men supplied to put up work.

BRANCH WORKS, NEW CUMBERLAND, W. VA.

General Office and Works,
BURNS ST., CINCINNATI, O.

SEND YOUR ORDERS FOR

Vol. III. of King's Treatise

AT ONCE.

CIRCULAR TO GAS LIGHT COMPANIES.

BRANCH OFFICE OF THE STRONG GAS FUEL AND LIGHT COMPANY,
CORNER BROADWAY AND MAIN STREET, YONKERS, July 2, 1881.

The YONKERS FUEL GAS COMPANY is now in successful operation, manufacturing Water Gas by the STRONG PROCESS, for HEAT, POWER, and LIGHT.

It has about two and a half miles of mains already in use through the heart of the city of Yonkers, and is supplying gas for cooking, heating, and various industrial purposes.

The problem of a purely fuel gas is at length practically solved, and is a complete success. That it must speedily go into universal use is apparent to everyone.

Gas Light Companies are cordially invited to visit Yonkers and inspect this new system, which, if electricity *should* eventually drive them out of the field of illumination, will open to them another field still more vast and fruitful, and from which they never can be dispossessed. The Westchester Gas Light Company of the city of Yonkers employes the Lowe Process for making its gas. Here, then, can be seen, side by side in business competition, the Strong and the Lowe against the Motay and the old coal gas methods, and each observer will be enabled to form his own opinion as to their relative power and value. The STRONG GAS FUEL AND LIGHT COMPANY is the proprietor for the State of New York of the Strong Patents, five in number, and of the Lowe Patents, two in number. All applications for licenses or for information should be addressed, as above, to

R. W. VAN PELT, *President of the Company,*
And also President of the Yonkers Fuel Gas Co., and of the Westchester Gas Light Co.

Parson's Steam Blower,

FOR IMPROVING BAD DRAUGHT IN BOILERS, AND FOR BURNING BREEZE OR OTHER WASTE MATERIAL.

PARSON'S TAR BURNER,

FOR UTILIZING COAL TAR AS FUEL.

PARSON'S AIR JET TUBE CLEANER,

FOR CLEANING BOILER TUBES.

These devices are all first-class. They will be sent to any responsible party *for trial.* No sale unless satisfactory. Manufactured by the WATERTOWN STEAM BLOWER COMPANY.

H. E. PARSON, Supt., 42 PINE ST., N. Y.

Awarded the Semi-Centennial Gold Medal by the Am. Inst., 1881. Awarded the First Premium at St. Louis, 1881.

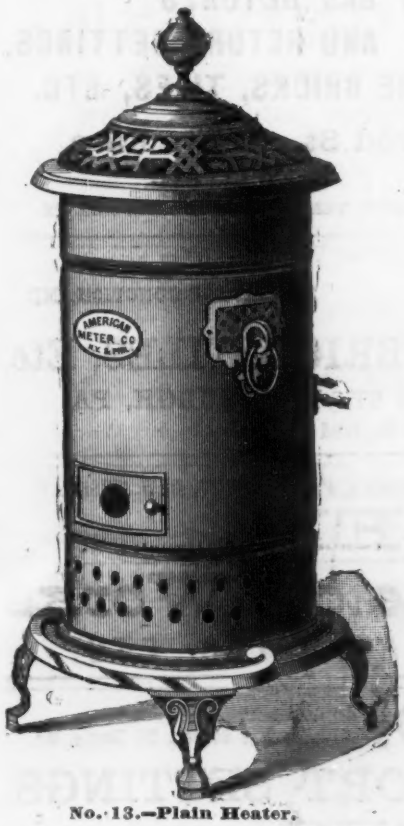
AMERICAN METER CO.,

SOLE MANUFACTURERS OF THE

"ECONOMY" GAS STOVES

We call attention to our new Catalogue of Heating Stoves, which is now ready, comprising descriptions and illustrations of a varied assortment of Plain and Reflecting Cylinder Stoves, Open Fire-Place Heaters, etc., designed to meet the demands of the approaching season. Gas Companies and others will confer a favor by sending for Catalogue and examining the merits of these Stoves, which we feel assured will give satisfactory results.

AMERICAN METER COMPANY



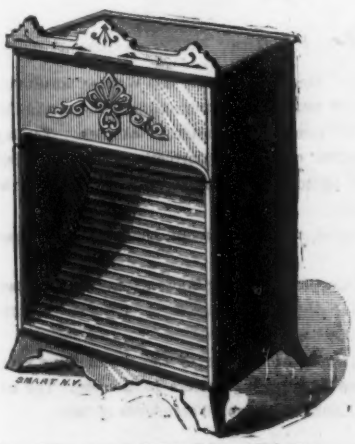
No. 13.—Plain Heater.

No. 19.—Open Fire-Place Heater.

No. 13.—Reflecting Heater.

Will Burn at a Low Pressure.

All Qualities of Gas can be Used.



No. 16.—Open Fire-Place Heater.

No. 18.—Open Fire-Place Heater.

No. 17.—Open Fire-Place Heater.

SEND FOR ILLUSTRATED CATALOGUE

AMERICAN METER CO., New York and Philadelphia.

J. H. CAUTIER & CO..

CORNER OF

GREENE AND ESSEX STREETS,

JERSEY CITY, N. J.

MANUFACTURERS OF

Clay Gas Retorts,

Gas House Tiles,

Fire Bricks, Etc. Etc.

Ground Clay, Fire Brick and Fire Sand in Barrels,

393 1y

J. H. GAUTIER.
C. E. GREGORY
T. B. GAUTIER.

BROOKLYN

Clay Retort & Fire Brick Works,

(EDWARD D. WHITE & CO.)

Manufacturers of Clay Retorts, Fire Brick, Gas House and other Tile.

VAN DYKE, ELIZABETH, RICHARDS & PARTITION STS.

Office, 88 Van Dyke St., Brooklyn, N. Y.

LACLEDE

FIRE BRICKS AND

GAS RETORT WORKS

CHELTENHAM, MO.

Hand and Machine made Retorts and Settings, Superior Fire Bricks for Siemans Gas and Glass Furnace. Bricks and Tiles for Whitwell's Hot Blast Ovens, Blast Furnace and Cupola Tiles, Etc.

Fire Bricks and Tiles

of all shapes and sizes.

Glass Pot Clay. Fine Ground Clay and Fire Bricks. Sewer Pipe, Etc.

901 Pine Street, St. Louis, Mo.

642—

ESTABLISHED IN 1845.

B. KREISCHER & SONS,

OFFICE FOOT OF HOUSTON ST., E.R., N.Y.

Gas Retorts,

TILES, FIRE BRICK.

AND EVERYTHING IN THE FIRE CLAY LINE.

MANHATTAN

FIRE BRICK & ENAMELLED CLAY

RETORT WORKS.

ADAM WEBER.

CLAY GAS RETORTS AND RETORT SETTINGS, FIRE BRICKS, TILES, ETC.,

Office and Works, 15th Street and Avenue C., N. Y.

Borgner & O'Brien,

MANUFACTURERS OF

CLAY GAS RETORTS AND RETORT SETTINGS, FIRE BRICKS, TILES, ETC.

23d St., Above Race,

PHILADELPHIA.

TWENTY YEARS' PRACTICAL EXPERIENCE.

Works, LOCKPORT, PA.

GARDNER BROTHERS,

—ESTABLISHED 1864.—

Works, MT. SAVAGE JUNCTION, MD.

CLAY GAS RETORTS, RETORT SETTINGS, FIRE BRICK, TILES, Etc.

MINERS & SHIPPERS OF FIRE CLAY. OFFICE, 116 SMITHFIELD ST., PITTSBURGH, PA.

C. H. SPRAGUE, No. 13 EXCHANGE PLACE, BOSTON, MASS., Agent for the New England States.

OFFICE, 418 to 422 East 23d St., New York. ESTABLISHED 1856. WORKS, PERTH AMBOY, NEW JERSEY.

HENRY MAURER,

Excelsior Fire Brick & Clay Retort Works

CLAY GAS RETORTS, BENCH SETTINGS, FIRE BRICK, TILES, ETC.

Works, Howard Station, Mo. Pacific R.R.

EVENS & HOWARD,

Office, 916 Market Street, St. Louis, Mo.

FIRE BRICK, GAS RETORTS, AND RETORT SETTINGS.

SEWER PIPE, 3 TO 24 INCHES DIAMETER.

Glass Pot Clay, Ground Fire Clay, in Barrels and in Bulk. All kinds of Fire Clay Goods.

CHICAGO

RETORT & FIRE BRICK WORKS,

394 to 402 N. WATER ST., CHICAGO, ILL.

GEORGE C. HICKS, PRESIDENT.

STANDARD

Clay Retorts and Settings,

BLOCKS & TILES

Of every Shape and Size to Order.

STANDARD FIRE BRICKS.

Doubled Milled Clay, Ground Bricks, and Fine Sand of Purest Quality.

Non-Conducting Porous Bricks for Bench Fronts.

Special goods for Smelting, Assaying, and Chemical Manufacture.

THE GAS ANALYST'S MANUAL.

BY F. W. HARTLEY, A.I.C.E., M.S.E. E. & F. N. SPON, PUBLISHERS.

PRICE, $2.50.

CONTENTS SECTION I.—The purposes of photometry. Standard light. Standard burner. Gas Works Clauses Act-Amendment Act, 1871.—Regulations in respect of testing apparatus, mode of testing for illuminating power, and for sulphuretted hydrogen. Description of standard apparatus. The photometer room. Preparation of candles. Testing operations. Readings. Correction for gas consumpt. Corrections for candles' consumpt. Corrections for barometric pressure and temperature. Ordinary photometers. The inferential or jet photometers. To set the jet photometer at work. To rate the jet photometer.

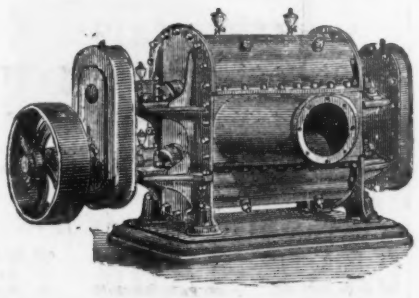
SECTION II.—Duration and mode of testing in London, sulphuretted hydrogen, ammonia, sulphu compounds. Preparation of solutions. Fitting up. To set the apparatus at work. Analysis.

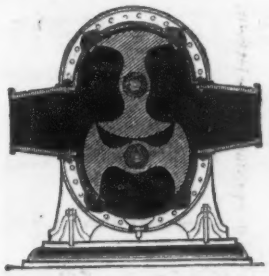
SECTION III.—Ammonia. Sulphuretted hydrogen. Carbonic acid. The Cooper's Tube, or Eudiometer. To calculate weight of sulphur. Harcourt's color test. A rapid and accurate methodof estimating sulphur in coal gas. Specific gravity. To find the specific gravity of dry gas. To correct the bulk and find the weight of gas.

APPENDIX.—Rules and tables to facilitate the calculations necessary in the determination of the illuminating value and degree of purity of coal gas. Photometry. Ammonia and sulphur. Proving of testing meters in London. The gas referees' cubic-foot measure. Times and mode of testing for pressure in London. Proposed standards of light.

A. M. Callender & Co., 42 Pine Street, N. Y.

P. H. & F. M. Roots'





IMPROVED GAS EXHAUSTER

With Engine on same Bed Plate, or without.

BYE-PASSES, GAS VALVES, GOVERNORS, ELBOWS, PIPE-FITTINGS, &C., FURNISHED TO ORDER.

P. H. & F. M. ROOTS, } Patentees and Manufacturers, {CONNERSVILLE, IND.

S. S. TOWNSEND, General Agent, 6 Cortland St. and 8 Dey St., N. Y.
JAS. BEGGS & CO., Selling Agents, 8 Dey St., N. Y.
WM. COOKE, Selling Agent, 6 Cortland St., N. Y.

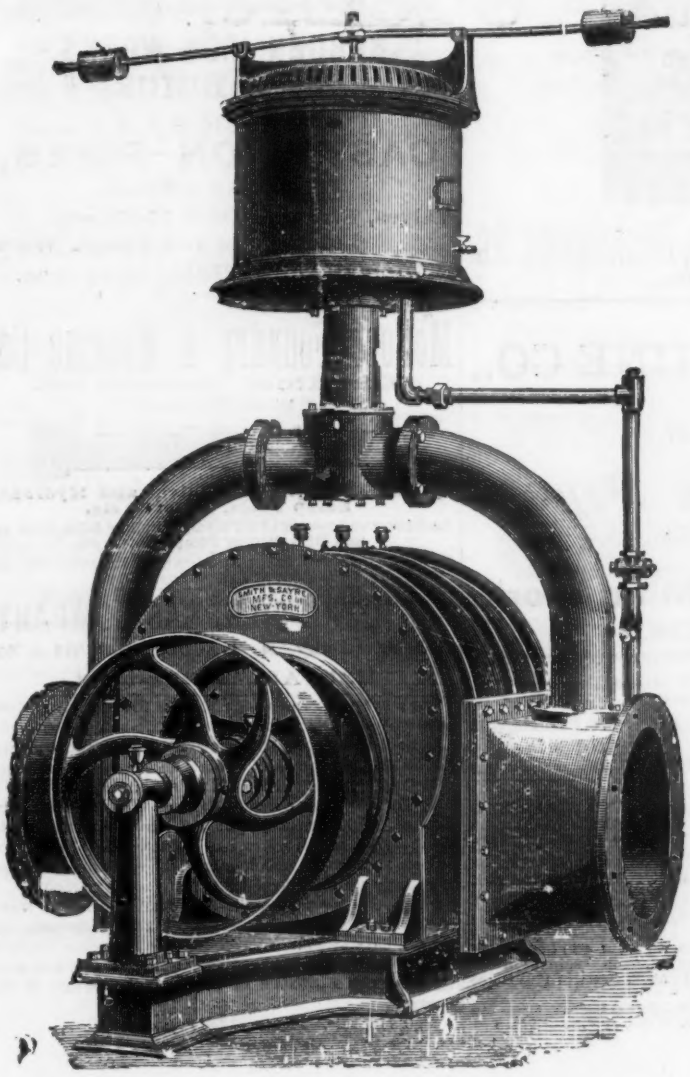
Send for Illustrated Catalogue and Price List.

SMITH & SAYRE MANUFACTURING COMPANY.

No. 245 BROADWAY, N. Y.

BUILDERS OF

Machinery and Apparatus for Gas Works.



MACKENZIE'S PATENT ROTARY AND STEAM JET GAS EXHAUSTERS, GOVERNORS, COMPENSATORS, BY-PASSES, CONDENSERS, WASHERS, SCRUBBERS.

ISBELL'S PAT. AUTOMATIC STREET PRESSURE GOVERNOR.

HIGH SERVICE GOVERNOR, GAS AND WATER VALVES, HYDRAULIC MAIN DIP REGULATOR, BENCH CASTINGS, Etc. PURIFYING BOXES, TOWER SCRUBBERS, WITH AUTOMATIC WATER DISTRIBUTOR. *ISBELL'S PATENT SELF-SEALING RETORT DOORS.*

Plans and Estimates for the Improvement, Extension, or Alteration of Gas Works, or for the Construction o New Works.

G. G. PORTER, *President*
CHARLES W. ISBELL, *Secretary.*

MITCHELL, VANCE & CO.

Manufacturers of

CHANDELIERS.

And Every Description of

GAS FIXTURES,

Also Manufacturers of

Fine Gilt Bronzes and Marble Clocks, warranted best Time-keepers Mantle Ornaments, &c.

Salesroom, 836 BROADWAY.

NEW YORK.

Special designs furnished for Gas Fixtures for Churches Public Halls, Lodges, &c,

---

F. O. NORTON,

MANUFACTURER OF

Hydraulic Cement,

Specially adapted for gas works Under water it is capable of giving better results than Portland or any other cement.

92 Broadway, New York.

Iron Sponge

AND

GAS EXHAUSTERS.

CONNELLY & CO.,

No. 407 BROADWAY, NEW YORK CITY

NEW BOOKS.

OBSERVATIONS ON GLASS AS AN OBSTRUCTOR AND REFLECTOR OF ARTIFICIAL LIGHT, 25 cts.

TRANSPORT OF MATERIALS FOR GAS WORKS, $1.25.

GAS ENGINEER'S DIARY AND TEXT BOOK FOR 1881. $2.00.

A. M. CALLENDER & CO.,
42 PINE STREET, N. Y. CITY.

PRESERVE

The Journal!

BY THE USE OF

THE STRAP FILE.

Advantages of the Strap File.

1st. It is simple, strong, and easily used.

2d. Preserves papers without punching holes.

3d. Will always lie flat open.

4th. Allows any paper on file to be taken off without disturbing the others.

We will furnish to our subscribers this important article for preserving, in a convenient form, the numbers of the JOURNAL as it is issued, at the very low price of $1.25. Sent either by express or mail, as directed.

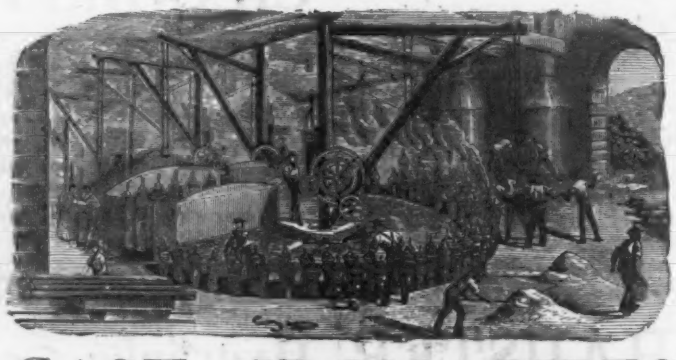
By mail the postage will be 20 cents, which will be added to the price of the Binder.

A. M. CALLENDER & CO., 42 Pine Street Y.

A. H. M'NEAL,

BURLINGTON, N. J.

Flange-Pipes



General Foundry Work.

CAST IRON PIPES

FOR WATER AND GAS

JAMES S. MOORE, Pres.
BENJAMIN CHEW, Treas.

JAS. P. MICHELLON, Sec.
WM. SEXTON, Supt.

GLOUCESTER IRON WORKS,

GLOUCESTER CITY N. J.

Cast Iron Gas & Water Pipes, Stop Valves, Fire Hydrants, Gasholders. &c.

Office No. 6 North Seventh Street, Philadelphia.

ESTABLISHED 1856.

WARREN FOUNDRY AND MACHINE CO.,

WORKS AT PHILLIPSBURGH, N. J.

NEW YORK OFFICE, 153 BROADWAY.

Cast Iron Water and Gas Pipe

FROM TWO TO FORTY-EIGHT INCHES DIAMETER.

ALSO ALL SIZES OF

FLANGE PIPE for Sugar House and Mine Work.

Branches, Bends, Retorts, Etc., Etc. 436-1

SCIENTIFIC BOOKS.

We are prepared to furnish to GAS MANAGERS nd others interested in the topics treated of, the following Books, at prices named :

GAS MANUFACTURE, by WILLIAM RICHARDS, 4 to, with numerous Engravings and Plates, in Cloth binding. $12.

THE GAS ANALYST'S MANUAL, by F. W HARTLEY. $2.50.

ANALYSIS, TECHNICAL VALUATION, PURIFICATION and USE OF COAL GAS, by Rev. W. R. BOWDITCH, M. A., with Engravings. 8 vo., Cloth. $4.40.

GAS WORKS STATISTICS, by CHAS. W. HASTINGS. $1.00.

GAS CONSUMERS HAND BOOK, by WM. RICHARDS, C. E. 18 mo. Sewed. 20 Cents.

GAS CONSUMERS MANUAL, by E. S. CATHELS, C.E. 10 Cents.

PRACTICAL TREATISE ON HEAT, by THOMAS BOX. Second edition. $5.

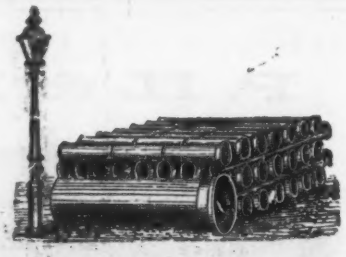
AIR AS FUEL, OR PETROLEUM AND OTHER MINERAL OILS UTILIZED BY CARBURETTING AIR, by OWEN C. D. ROSS, Member Institute Civil Engineers. 8 vo. Cloth. $1.50.

FODELL'S SYSTEM OF BOOKKEEPING FOR GAS COMPANIES. $5.

The above will be forwarded by Express, upon receipt of price.

We will take especial pains in securing and forwarding any other Works that may be desired, upon receipt of order. All remittances must be made by Check, Draft, or Post Office Money Order.

A. M. CALLENDER & CO.,
Room 18, No. 42 Pine St., N. Y



R. D. WOOD & CO.,

PHILADELPHIA.

MANUFACTURERS OF

CAST IRON PIPE

FOR GAS AND WATER

Lamp Posts, Valves, Etc.

Mathew's Pat. Anti-Freezing Hydrants.

400 Chestnut Street.

JAMES MARSHALL & CO.

Franklin Foundry and Pipe Works,

MANUFACTURERS OF

GAS, WATER, AND OIL PIPES

Works, 18th, 19th, 20th and Railroad Street.
Office, No. 23 Nineteenth Street.

Pittsburgh, Pa.

N.B.—Pipes from 3-inch and upwards cast in 12 ft. lengths.
☞ Send for Circular and Price List.

BERGEN IRON WORKS.

R. A. BRICK,

MANUFACTURER OF

CAST IRON PIPES,

FOR WATER AND GAS,

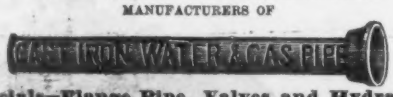
Valves, Fire and Dock Hydrants,
Lamp-Posts and Flange Work,

WILLIAM W. CAMPBELL, Selling Agent,
Office, 85 Liberty St., N. Y.

Mellert Foundry & Machine Co.,

Limited. Established 1848.

MANUFACTURERS OF



Specials—Flange Pipe, Valves and Hydrants, Lamp Posts, Retorts, etc.

Machinery and castings for Furnaces, Rolling Mills, Grist and Saw Mills, Mining Pumps, Hoists, etc.

OFFICES.—SECOND AND CHESTNUT STS., READING, PA., and 74 PINE ST., NEW YORK CITY.

NATIONAL COAL GAS COMPANY.

320 Broadway, N. Y., Rooms 50, 51 & 52.

H. P. ALLEN, President.

The process known as GWYNNE-HARRIS, but from later most essential improvements, more appropriately called the ALLEN-HARRIS, or AMERICAN HYDROCARBON process for making "Water Gas," by the decomposition of superheated steam, in fire-clay retorts, set similarly to those in Coal Gas Works, is an established success. More than One Hundred Million cubic feet of gas have been made under this process, and for *permanency* and *brilliancy*, as well as economy both to the manufacturer and consumer, it is superior to any gas made by the old, or any other method.

Our process is *not intermittent* but continuous. The steam and the oil are admitted into the retorts by gauge cocks, and run for days without change. All the materials required, besides the steam, are 17 lbs. of Anthracite coal and about 3½ gallons of Petroleum or Naphtha, per 1000 feet of brilliant gas.

Rights for sale. Inquire of the President.

HERRING & FLOYD,

Oregon Iron Works,

738, 740, 742 & 744 Greenwich St., N. Y.

Practical Builders of Gas Works,

MANUFACTURERS OF

ALL KINDS OF CASTINGS

AND

APPARATUS FOR GAS-WORKS.

BENCH CASTINGS from benches of one to six Retorts each.

WASHERS: MULTITUBLAR AND AIR CONDENSERS; CONDENSERS: SCRUBBERS wet and dry), and

EXHAUSTERS for relieving Retorts from pressure.

BENDS and BRANCHES of all sizes and description.

FLOYD'S PATENT MALLEABLE RETORT LID.

PATENT SELF-SEALING RETORT LIDS.

FARMER'S PATENT BYE-PASS DIP-PIPE.

SABBATON'S PATENT FURNACE DOOR AND FRAME.

BUTLER'S COKE SCREENING SHOVELS.

GAS GOVERNORS,

and everything connected with well regulated Gas Works at low price, and in complete order.

SEILER'S CEMENT

for stopping leaks in Retorts.

N. B.—STOP VALVES from three to thirty inches—at very low prices.

Plans, Specifications, and Estimates furnished.

SILAS C. HERRING. JAMES R. FLOYD.

H. RANSHAW, Pres. & Mangr. T. H. BIRCH, Asst. Mangr.
WM. STACEY, Vice-Pres. R. J. TARVIN, Sec. & Treas.

STACEY MANUFACTURING CO.,

MANUFACTURERS OF

Single and Telescopic Gasholders,

IRON ROOFS, BRIDGES, LAMP POSTS,

WATER AND OIL TANKS, COAL ELEVATOR CARS,

COKE CRUSHERS,

BENCH CASTINGS,

And all kinds of Wrought and Cast Iron Work used in the erection of Coal and Oil Gas Works. Rolling Mill Machinery and Heavy Castings a Specialty.

Foundry: 33, 35, 37, & 39 Mill St., Wrought Iron Works: 16, 18, 20, 22, 24, & 26 Ramsey St.,

CINCINNATI, OHIO.

MORRIS, TASKER & CO.,

Limited,

Builders of Gas Works,

PHILADELPHIA, PA.

1842. DEILY & FOWLER 1881.

LAUREL IRON WORKS.

ADDRESS, 39 LAUREL STREET, PHILA

MANUFACTURERS OF

GAS HOLDERS,

SINGLE AND TELESCOPIC—WITH CAST OR WROUGHT IRON GUIDE FRAMES.

We are prepared to furnish Holders, Wrought Iron Roof Frames, Bench Castings, Condensers, Scrubbers, Purifiers, Dips, Bends, Tees, and all other Iron Work connected with Gas Works. We have built 12 gas works and 135 gasholders. Personal supervision given to the erection of all our work. Holders built at following places since 1868:

Lancaster, Pa. (2)
Williamsport, Pa. (3)
Bristol, Pa. (2)
Catasauqua, Pa.
Kittanning, Pa.
Hazelton, Pa.
Freeport. Pa.
Huntingdon, Pa.
Pittston Pa.
Bethlehem (S). Pa.
Sharon, Pa.
Canton, Pa.
Carlisle, Pa.
Beaver Falls, Pa.
Annapolis, Md. (2)
Parkersburg, W. Va.
Lynchburg, Va.
Stanton, Va.
Youngstown, O
Steubenville, O.
Zanesville, O.
Mansfield, O.
Marion, O.
Belleaire, O.
Athens. O.
Barnesville, O.
Newark, O.
Columbus, O.
Franklin, Ind.
Plainfield, N. J.
Englewood, N. J.
Flemington, N. J. (2)
Dover, Del.
Pittsfield, Mass.
Meriden, Conn.
Indianapolis, Ind.
Jacksonville, Ill.
Joliet, Ill.
Lawrence, Kansas.
Jefferson City, N. O. La. (2)
Algiers, N. O., La.
Kalamazoo, Mich
Buffalo, N. Y. (2)
Ogdensburg, N. Y
Waverly, N. Y.
Little Falls, N. Y.
Penn Yann, N. Y.
Watkins, N. Y.
Coney Island, N. Y.
Batavia, N. Y.
Gloucester, N. J.
Salem, N. J.
Milwaukee, Wis.
Burlington, Vt.
Hoosick Falls, N. Y.
Attica, N. Y.
Mount Holly, N. J.
Mount Joy, Pa.
Rockaway Beach, L. I. (2)
Zanesville, O. (2)
Lancaster, O.
Blackwell's Island, N Y
Waltham, Mass.
Dorchester, Mass.
Wheeling, W Va.
Lansing, Mich.
Flint, Mich.
Milton, Pa,
Galveston, Texas.

NOW READY,

VOLS. I. AND II. OF

King's Treatise on Coal Gas

BOUND IN CLOTH. PRICE, $10 EACH.

A. M. CALLENDER & CO.,

42 Pine Street, N. Y.

The Kerr Murray Mfg. Co.,

THE LATEST IMPROVED

Gas Apparatus

AND

MACHINERY,

Wrought Iron Roofs and Bench Castings,

SINGLE LIFT AND TELESCOPIC GASHOLDERS.

FORT WAYNE, IND.

BARTLETT, HAYWARD & CO.

ARCHITECTURAL IRON WORKS.

MANUFACTURERS OF

GAS HOLDERS, BENCH CASTINGS, MULTITUBULAR WATER AND AIR CONDENSERS, COMMON AND TOWER SCRUBBERS, ROTARY & STEAM JET EXHAUSTERS, WROUGHT IRON ROOF FRAMES.

MANUFACTURERS OF ALL DESCRIPTIONS OF GAS APPARATUS.

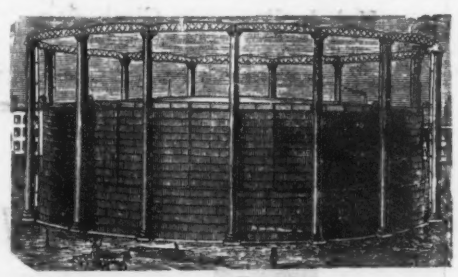
WORKS:

Cors. Pratt, Scott, McHenry, Ramsay and Bartlett Streets.

BALTIMORE, MARYLAND.

Plans, Specifications, and Estimates furnished. Correspondence solicited. 467-1y

CONTINENTAL WORKS.



GASHLODERS OF ANY MAGNITUDE.

T. F. ROWLAND, Proprietor,

GREENPOINT, BROOKLYN, N. Y

ENGINEER AND MANUFACTURER OF

GAS-HOLDERS.

CONDENSERS, SCRUBBERS, VALVES, PURIFIERS, RETORTS, and HYDRAULIC MAINS,

and all other articles connected with the Manufacture and Distribution of Gas. Plans and Specifications prepared and Proposals given for the necessary Plans for Lighting Cities. Towns, Mansions, and Manufactories.

P. MUNZINGER,

Engineer and Builder,

No. 1211 MARKET STREET, PHILADELPHIA, PENN

BUILDER AND CONSTRUCTOR OF ALL KINDS OF GAS MACHINERY,

ON THE LATEST AND MOST IMPROVED PLAN.

Bench Castings, Condensers, Scrubbers, Purifiers, Centre Valves, Gasholders, Stop Valves, Etc., Etc.

Estimates and Drawings Furnished upon Application.

GAS COALS. GAS COALS. GAS COALS.

"SCOTT'S" OCEAN MINE

YOUGHIOGHENY GAS COAL.

W. L. SCOTT & CO., Proprietors, ERIE, PA.

This Colliery is located at Scott Haven, on the Youghiogheny River, Westmoreland County, Pa., directly adjoining the Penn Company's Youghiogheny Mine. (See map on p. 27, Vol. XXXVI., of this Journal.)

The property consists of over **3,300 ACRES,** situated in the center of the celebrated Youghiogheny Coal Field, and comprises within its limits the **MOST VALUABLE GAS COAL** in Western Pennsylvania.

Over **300,000 TONS,** of this coal have been forwarded to Baltimore during 1880 and 1881, distributed among **OVER SIXTY GAS LIGHT COMPANIES,** from Bangor, Maine, to Galveston, Texas.

The universal favor with which this coal has been received has induced Messrs. Scott & Co. to increase their already large facilities for meeting the wants of Gas Companies, giving to consumers an undoubted guarantee that delivery will be promptly made. Applications addressed to the undersigned will meet with prompt response.

Orders for delivery in **NEW ENGLAND** can be addressed to our Boston office, No. 21 EXCHANGE PLACE or P. O. Box 3003, BOSTON.

PERKINS & CO., General Sales Agents,

New York P. O. Box, 3695. **45 SOUTH STREET, N. Y.**

G. W. DRESSER, C.E.,

Member American Society Civil Engineers.

CONSULTING ENGINEER

ON ALL MATTERS PERTAINING TO

Gas Manufacture.

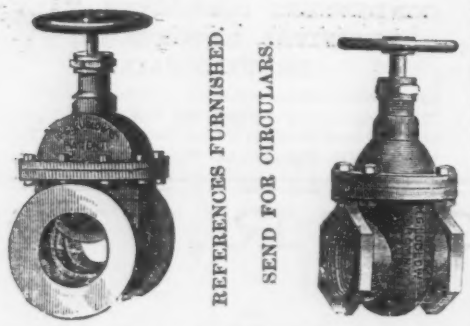
LUDLOW

Valve Manf'g Co.,

OFFICE AND WORKS

938 to 954 River Street and 67 to 83 Vail Ave.

TROY, NEW YORK.



REFERENCES FURNISHED. SEND FOR CIRCULARS.

BRASS AND IRON SLIDE VALVES,

Double and Single Gate, ¼ inch to 36 inch—outside and inside screws, Indicator, etc.,—for Gas, Water, Steam, and Oil.

HYDRAULIC MAIN DIP REGULATORS.

ALSO

FIRE HYDRANTS.

C. GEFRORER.

Manufacturer of

GAS BURNERS

GAS HEATING AND COOKING APPARATUS.

FITTERS' PROVING APPARATUS, ETC.

No. 284 North Eighth Street, Philadelphia.

KING'S TREATISE

ON

COAL GAS.

Vol. I., Bound in Cloth, $10.

A. M. CALLENDER & CO., 42 Pine Street, N. Y.

S. McCRICKART, Pres't. J. E. McCRICKART, Mang'r.

THE FORT PITT COAL CO.,

Miners and Shippers of

COAL FORT PITT GAS COAL COKE

No. 337 Liberty Street,

PITTSBURGH, PENN.

CHAPMAN

VALVE MANUFACTURING COMPANY,

MANUFACTURERS OF

Steam, Gas, and Water Valves and Gates.

FIRE HYDRANTS,

WITH POSITIVE DRIP.

All Valves and Hydrants furnished with

Babbitt Metal Seats & Non-Corrosive Working Parts.

WORKS AT INDIAN ORCHARD, MASS.

Boston Office, 77 Kilby St. New York Office, 28 Platt St.

ALL WORK GUARANTEED.

GAS COALS. GAS COALS. GAS COALS.

NEW YORK AND CLEVELAND

GAS COAL COM'Y

Of Pittsburgh, Pa.

MINERS AND SHIPPERS OF

YOUGHIOGHENY GAS COAL.

This Company is prepared to furnish any amount of their justly celebrated, and acknowledged superior GAS COAL, to any point reached by railroad or navigation, on most favorable terms.

General Office—89 Wood Street, PITTSBURGH, PA.

Branch Office—120 Water Street, CLEVELAND, OHIO.

WILLIAM A. McINTOSH, President.
A. CARNEGIE, Vice-President.
W. P. DE ARMIT, Treasurer.
THOMAS AXWORTHY, Agent at Cleveland, Ohio.

351-1y

NEWBURGH

ORREL COAL COMPANY,

MINERS AND SHIPPERS OF

Newburgh Orrel, Tyrconnell and Palatine Gas Coals.

ALSO SHIPPERS OF

FOUNDRY COKE

Mines Situated at

NEWBURGH, FLEMINGTON, AND FAIRMONT, WEST VIRGINIA,

HOME OFFICE,

25 S. Gay St., Baltimore.

CHARLES MACKALL,
SECRETARY.

CHAS. W. HAYES, Agent in New York,

No. 111 Broadway - - Trinity Building.

Shipping wharves at Locust Point. References furnished when required. Special attention given to chartering vessels.

THE

PENN GAS COAL COMPANY

OFFER THEIR

COAL, CAREFULLY SCREENED,

AND PREPARED FOR

GAS PURPOSES.

Their Property is located in the Youghiogheny Coal Basin, near Irwin's and Penn Station on the Pennsylvania Railroad, and on the Youghiogheny River.

OFFICES

No. 209 South Third Street, Phil'a. 90 Wall Street, New York.

PLACES OF SHIPMENT.

Pennsylvania Railroad, Pier No. 2 (Lower Side).
Greenwich Wharves, Delaware River.
Pier No. 1 (Lower Side), South Amboy, N. J.

366-1y

CANNELTON COAL COMPANY

Miners of the celebrated CANNELTON CANNEL, acknowledged to be the *best enricher* produced in this country, yielding 10,000 cubic feet of 64.54 candle gas per ton of 2,240 pounds.

J. TATNALL LEA, Treasurer, P. O. Box 1747 Philadelphia.

SALES AGENTS: C. & O. R'way Coal Agency N. Y. BENEDICT & DOWNS, New Haven. DANIEL W. JOB & CO., Boston. DAVIS, MAYER & CO., Baltimore.

Chesapeake & Ohio Railway Coal Agency,

FOR THE SALE OF THE

SUPERIOR KANAWHA GAS COALS,

Also, SPLINT AND STEAM COALS,

From the Kanawha and New River Regions, on the line of the Chesapeake & Ohio R'way.

C. B. ORCUTT, SECRETARY.
J. J. GORDON, SALES AGENT.

OFFICE, 22 PINE STREET, N. Y.

THE AMERICAN

GAS-LIGHT JOURNAL.

$3 PER ANNUM.

42 Pine Street, N. Y.

THE DESPARD COAL COMPANY

OFFER THEIR SUPERIOR

DESPARD COAL

To Gas Light Companies throughout the country.

Agent, ALFRED PARMELE, No. 32 Pine street, N. Y.

BANGS & HORTON, No. 31 Duane street, Boston.
Mines in Harrison County, West Virginia.
Wharves Locust Point, Company's Office, 15 German St., } Baltimore.

Among the consumers of Despard Coal, we name: Manhattan Gas Light Company, New York; Metropolitan Gas Light Company, New York; Jersey City Gas Light Company, N. J.; Washington Gas Light Company; Portland Gas Light Company, Maine.

. Reference to them is requested. 204-

"Economy of Gas as a Fuel for Cooking Purposes."

This is a small Pamphlet containing the Paper read by

MR. WILLIAM W. GOODWIN, OF PHILADELPHIA, PA.,

At the recent meeting of the American Gas Light Association.

IT IS INTENDED FOR GRATUITOUS DISTRIBUTION BY GAS COMPANIES AMONG THEIR CONSUMERS

Price, Twelve Dollars per Thousand.

A. M. CALLENDER & CO., No. 42 Pine Street, New York.

INTERNATIONAL--1876--EXHIBITION.

The U. S. Centennial Commission

HAVE DECREED AN AWARD TO

HARRIS, GRIFFIN & CO.,

12th and Brown Sts., Philadelphia, and 49 Dey St., N. Y., U. S. A..

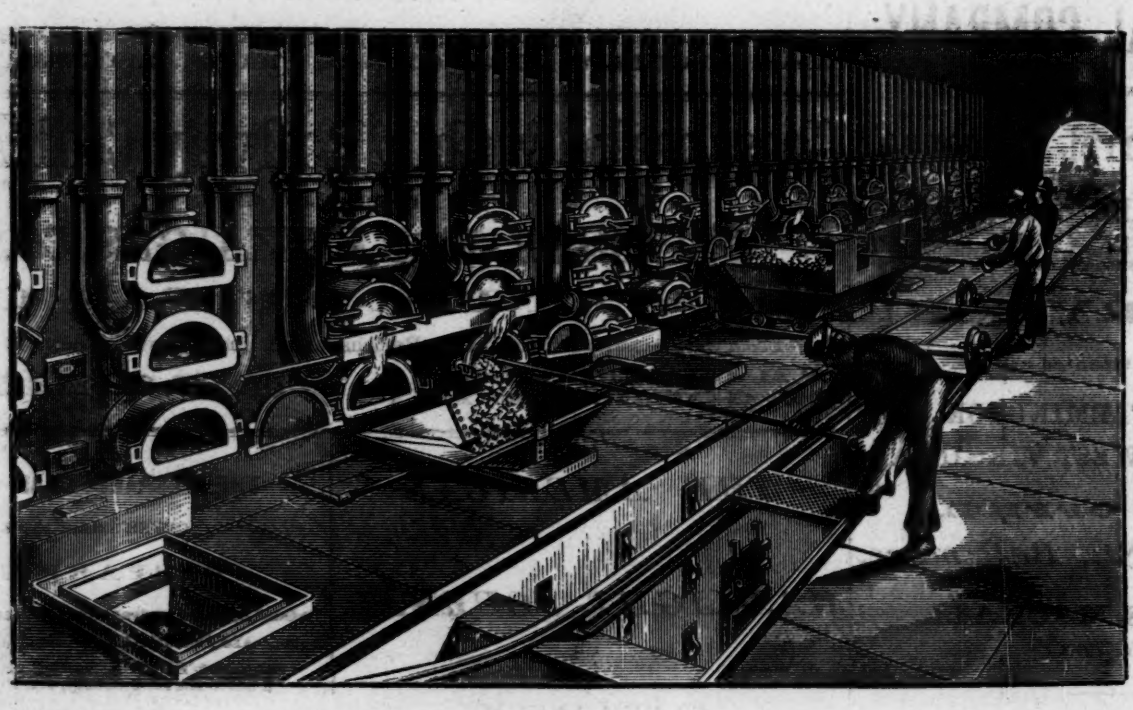
FOR THE FOLLOWING REASONS:

The Exhibit consists of a Series of METERS from the Largest Size Station Meters for the use of the MANUFACTURE OF GAS, to those for the use of the ORDINARY CONSUMER. The Instruments are WELL MADE, RELIABLE as to INDICATION, and embody a number of sundry improvements which, with the general character of the Exhibit, entitle the whole to commendation.

Attest—J. L CAMPBELL, Secretary, pro-tem. Signed—A. T. GOSHORN, Director General J. R HAWLEY, President

Chas. F. Dieterich's Regenerator Furnace.

CAN BE ADAPTED TO ANY BENCH WITHOUT DISTURBING THE ORDINARY SETTINGS.



These Furnaces have been in operation at the works of the People's Gas Company, Baltimore, since June, 1878. A bench of 6's, with retorts 20in.x12in.x8ft. 6in., will burn off 1,350 pounds of coal in 3 hours. Twenty-five per cent. of the coke is sufficient to thoroughly burn off the charges.

State, city, and factory rights granted on reasonable terms. For full particulars apply to either

CHAS. F. DIETERICH, Eng'r People's Gas Co., BALTIMORE, MD.

WM. FARMER, 111 Broadway, N. Y., F. L. HAGADORN, 162 Beach St. Chicago, Ill., or HENRY J. DAVISON, 231 Broadway, N. Y.

T. C. HOPPER, Prest. WM. H. HOPPER, Vice-Prest. WM. N. MILSTED, Gen. Supt. and Treas. WM. H. DOWN, Sec.

AMERICAN METER COMPANY,

WET AND DRY GAS METERS. PRESSURE REGISTERS. METER PROVERS.
STATION METERS. PRESSURE & VACUUM REGISTERS. PORTABLE TEST METERS.
EXHAUSTER GOVERNORS. PRESSURE & VACUUM GAUGES. EXPERIMENTAL METERS.
DRY CENTRE VALVES. CRESSON GAS REGULATORS. AMMONIA TEST METERS.
GOVERNORS FOR GAS WORKS. MARSLAND WATER METERS. BAR AND JET PHOTOMETERS.

Manufactories:
512 W. 22d St., N. Y.
Arch & 22d Sts., Phila.

GAS STOVES—AMERICAN, FRENCH, & ENGLISH.
SUGG'S ILLUMINATING POWER METER.
SUGG'S "STANDARD" ARGAND BURNERS. ALSO NN AND TTT.
Wet Meters, with Lizar's "Invariable Measuring" Drum.
Sole Agents for Wm. Cowan's Automatic Pressure Changer.

Agencies:
37 Water Street, Cincinnati.
20 South Canal Street, Chicago.
810 North Second Street, St. Louis.
122 & 124 Sutter St., San Francisco.

HELME & McILHENNY,

Successors to Harris & Brother.

ESTABLISHED 1848.

PRACTICAL GAS METER MANUFACTURERS,

Continue as heretofore at the OLD ESTABLISHMENT, Nos. 1115 and 1117 Cherry Street, Philadelphia, Pa

To manufacture Wet and Dry Gas Meters, Station Meters, Experimental Meters, Meter Provers, Centre Seals, Governors, Pressure Registers, Indicators, Photometers, and all kinds of Gas Apparatus; Also furnish all other Articles appertaining to the use of Gas Works.

From our long Practical Experience of the Business (covering a period of 33 years) and from our personal supervision of all Work, we can guarantee all orders to be executed promptly, and in every respect satisfactorily.

WILLIAM HELME. JOHN McILHENNY.

WM. WALLACE GOODWIN, Prest. and Treas. WM. H. MERRICK, V.-Prest. H. DUMONT WAGNER, Supt. S. L. JONES, Sec. S. V. MERRICK, Asst. Sec

THE GOODWIN GAS STOVE AND METER COMPANY,

Successors to W. W. GOODWIN & CO.

No. 1012, 1014 and 1016 Filbert Street, Philadelphia, Pa.

No, 142 Chambers Street, New York

MANUFACTURERS OF GAS STOVES FOR COOKING AND HEATING PURPOSES.

Dry and Wet GAS METERS, Station Meters (Square, Cylindrical or in Staves) Glazed Meters, King's and Sugg's Experimental Meters, Lamp Post Meters, Etc., Etc., Meter Provers (sizes 2, 5 and 10 feet), Pressure Guages of all kinds, Pressure Registers, Pressure and Vacuum Registers, Pressure Indicators (sizes 4 inch, 6 inch and 9 inch), King's Pressure and Vacuum Gauges, Dry and Wet Centre Seals, Dry and Wet Governors, Exhauster Governors, Photometers of all descriptions. Letheby's Sulphur and Ammonia Test Apparatus complete—also Testing and Chemical Apparatus of all kinds, and of the most perfect description, for all purposes relating to Gas.

Goodwin's Improved Lowe's Jet Photometer.

Special attention to repairs of Meters, and all apparatus connected with the business.
All work guaranteed first class in every particular, and orders filled promptly.

Review of Gas and Water Engineering.

ISSUED WEEKLY.

Edited and Published by CHAS. W. HASTINGS, 22 Buckingham St., London, Eng.

Each number contains articles in connection with the manufacture and supply of Gas; summary of latest intelligence on the subject of Electric Lighting; articles upon Water Supply; also on the Construction and Maintenance of Gas, Water, and Sewage Works.

Price, 13s., Postpaid.

The Gas and Water Companies' Directory.

Edited and Published Annually by CHARLES W. HASTINGS.

This Work gives a complete list of all Gas and Water Companies throughout England, Scotland, Ireland and Wales; date of formation, amount of capital and names of all officers, etc.; including carbonization returns, prices paid for gas, dividends, etc.

Price, in Cloth Covers, 5s; Paper Covers, 3s. 6d. Postage Extra

Address, 22 BUCKINGHAM STREET,
LONDON, W. C., ENGLAND

Orders Received at this Office.

NOW READY AND FOR SALE,

FODELL'S

System of Bookkeeping

FOR GAS COMPANIES.

Price $5, which should be sent either in Check, P. O. Order or Registered Letter.

Blank Books, with printed headings and forms on this system, will be supplied to Gas Companies, by applying to W. P. FODELL, Philadelphia, or

A. M. CALLENDER & CO.
OFFICE GAS LIGHT JOURNAL, 42 Pine St., N. Y.

CATHEL'S

GAS CONSUMERS MANUAL.

Enables every Gas Consumer to ascertain at a glance, without any previous knowledge of the Gas Meter, the quantity and money value of the Gas consumed. Also the best method of obtaining from Gas the largest amount of its light.

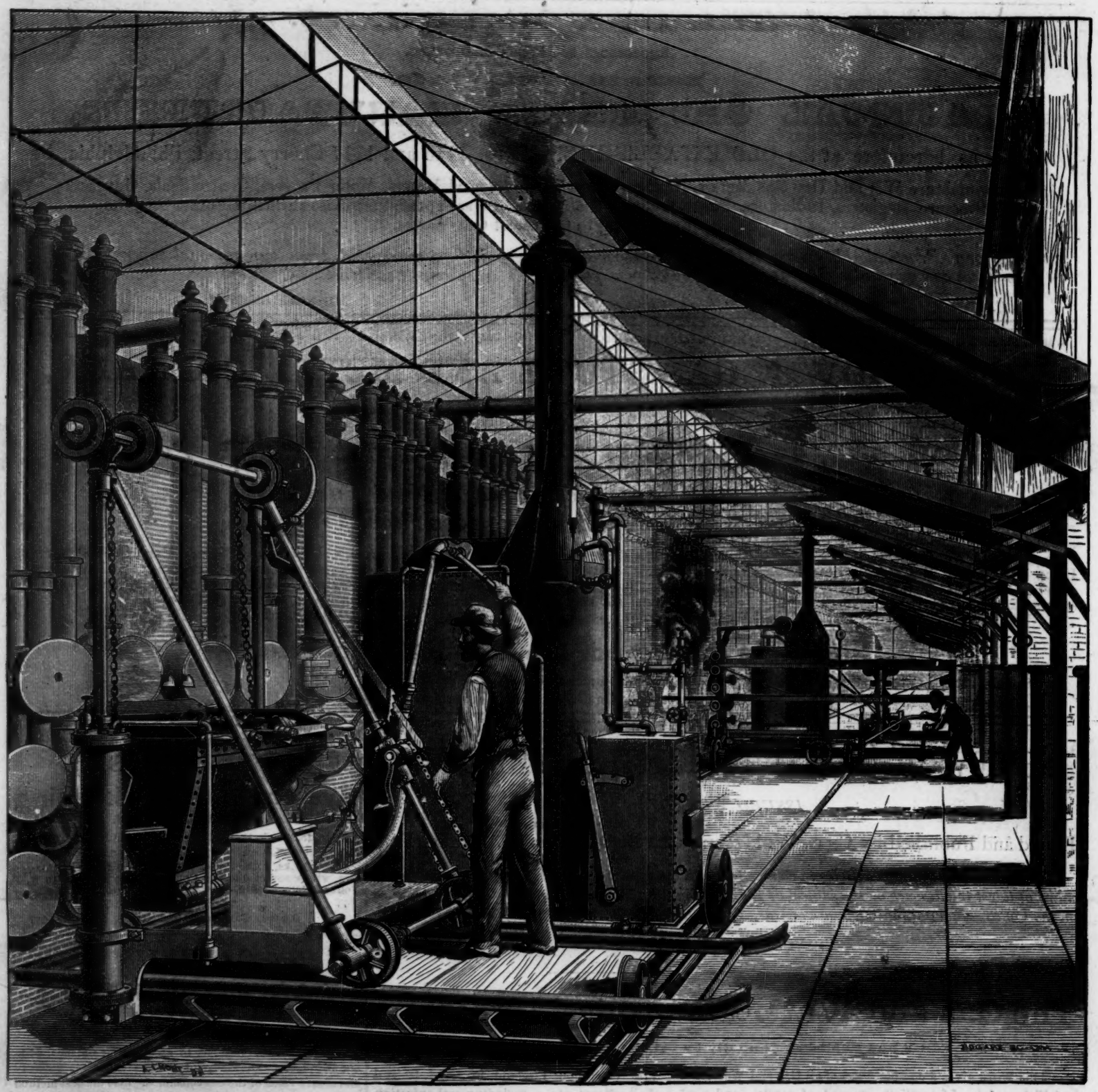
It will be to the advantage of Gas Companies to supply their Consumers with one of these Guides, as a means of preventing complaint arising from their want of knowledge in regard to the registration of their meters. For sale by

A. M. CALLENDER & CO.,
42 Pine Street, New York.

A. Q. ROSS'

STEAM STOKERS.

Now in continuous and systematic operation at the works of the Cincinnati Gas Light and Coke Company, Cincinnati, Ohio, where for the past sixteen months they have been drawing and charging retorts at the rate of one every minute. Simple in construction, and easily operated by any intelligent man.



Address, A. Q. ROSS, Manager,

U. S. STEAM STOKING COMPANY, CINCINNATI, OHIO, U. S. A.